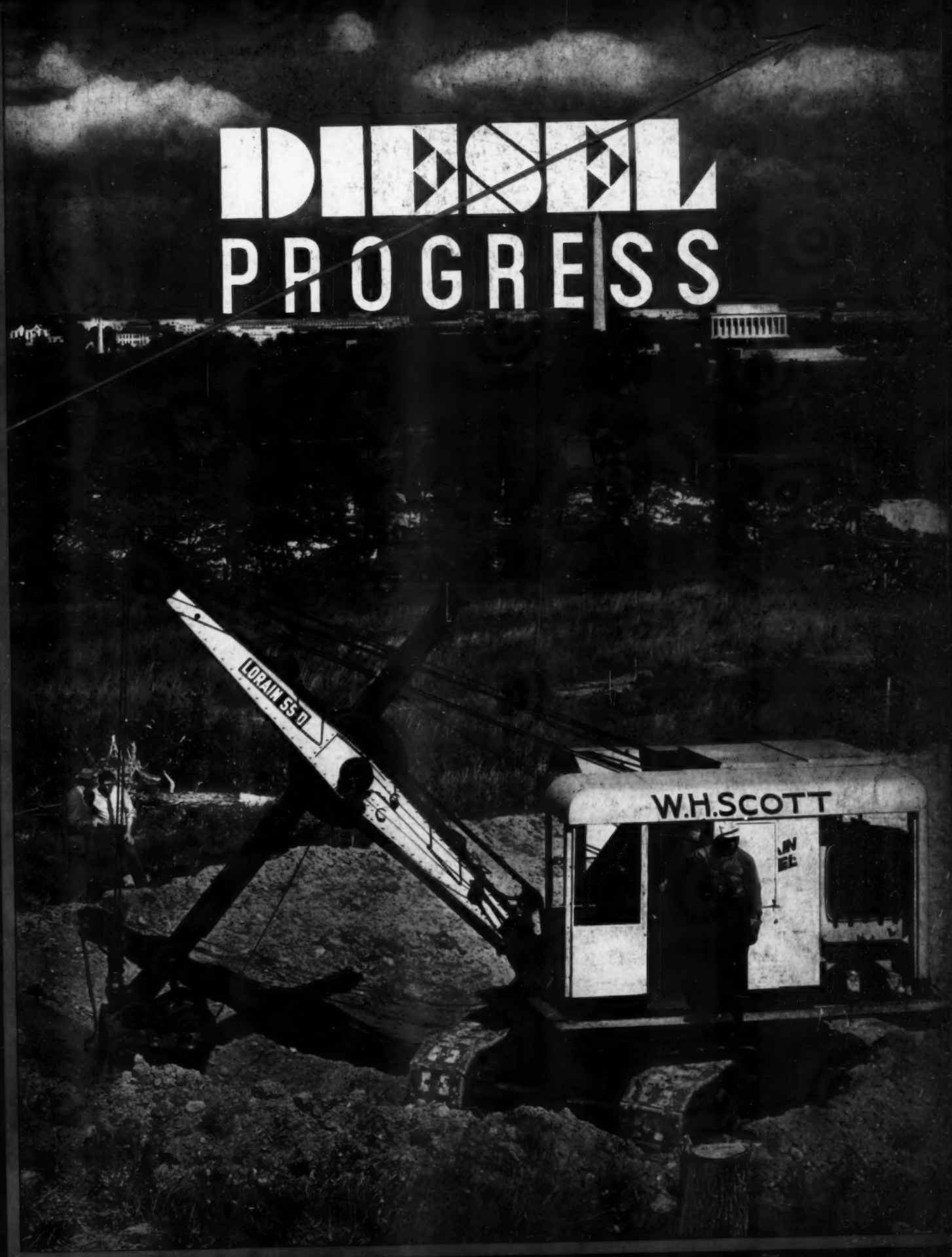
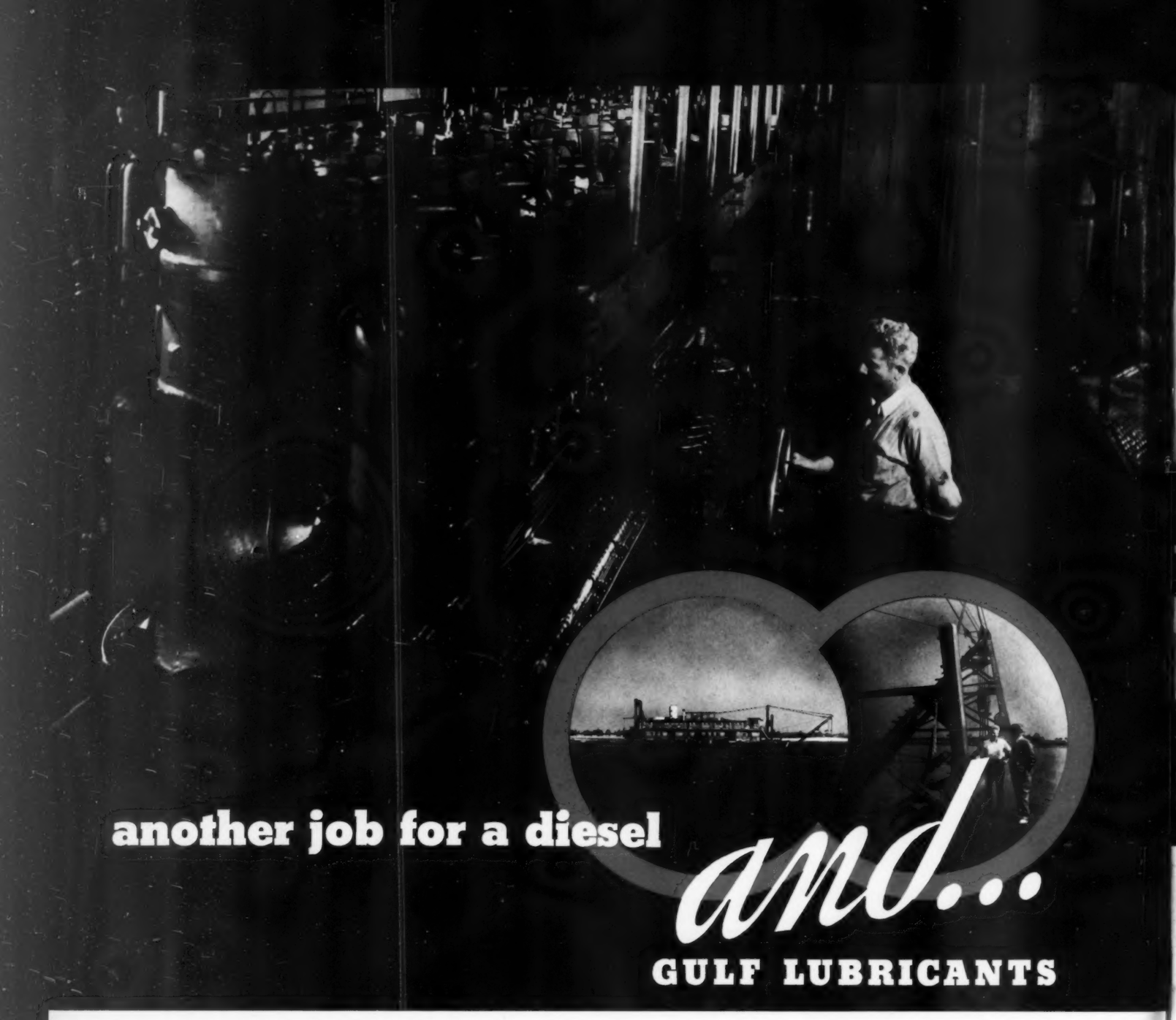
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



OCTOBER, 1937 CIRCULATION OF THIS ISSUE—IN EXCESS OF 11,000 COPIES 25c



another job for a diesel *and...* GULF LUBRICANTS

Operators of "NORMAN H. DAVIS" famous dredge that raised the Maine in Havana Harbor, protect newly installed Diesel with Gulf lubricants . . .

There was no Diesel in the famous dredge "Norman H. Davis" when she raised the battleship Maine in Havana Harbor. But there is today—and her owners have played safe with its lubrication. They called in the Gulf engineer to recommend the proper lubricants for this husky Diesel. And now it is giving efficient low-cost service on a big dredging job off the Florida coast, say the owners.

America's Diesel engine builders—more than 50 strong—have approved Gulf lubricants for the engines they build! So, when the Gulf engineer recommends certain brands for your Diesels, you *know* they are the *right* brands. And you know that your equipment is protected against excessive wear and maintenance expense.

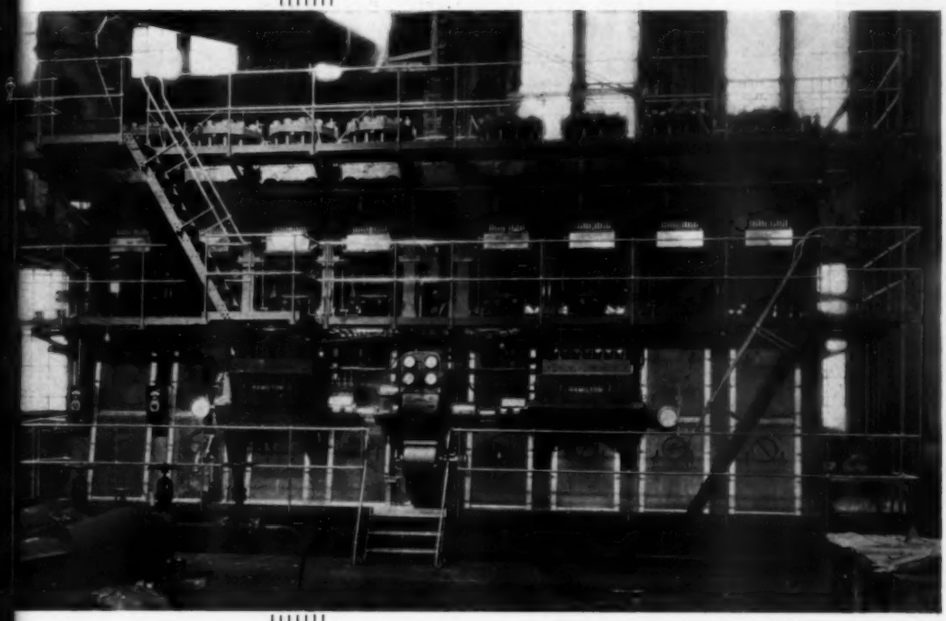
Every operator of Diesel engines, from Maine to Texas, can have the benefit of Gulf lubrication service—an inexpensive way to insure high-speed, low-cost work. We suggest that you talk with the Gulf engineer when he calls.

GULF OIL CORPORATION GULF INDUSTRIAL LUBRICATION **GULF REFINING COMPANY**

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

DIESEL PROGRESS for October, 1937. Volume III. No. 10. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at Brooklyn, New York, authorized May 14, 1935. Subscription rates: United Stattes and Possessions $3.00, Canada and all other countries $5.00 per year. Single copy price 25 cents in U. S. A., 50 cents for all other countries.

SALT RIVER VALLEY WATER USERS' ASSOCIATION BUYS A 7000 H. P. DIESEL



7000 hp. Hamilton - M.A.N. Two - Cycle, Double Acting, Eight - Cylinder, 24" x 36" Diesel Engine Purchased by the Salt River Valley Water Users' Association.

IT gives us a great deal of pleasure to announce the sale of a 5000 kw. Hamilton-M.A.N. Diesel engine to the Salt River Valley Water Users' Association, Phoenix, Arizona. This 7000 hp. eight-cylinder, double acting, two-cycle, 24" bore, 36" stroke, engine will be an exact dupliente of the five units installed at Vernon, Calif., with the exception that the generator on this new installation will be a 25-cycle unit. The new engine is to be used for standby and peak load service for the Association's hydro-electric system.

HAMILTON - M. A. N.

GENERAL MACHINERY CORPORATION

Hooven, Owens, Rentschler Division

Hamilton, Ohio

ERIE

Erie crankshafts in all five Winton-Diesel engines installed in the new Pacific Hopper Dredge designed by U. S. Engineers.

Dependability and long life, proved in innumerable marine installations, account for the repeated use of Erie equipment by vessel owners and builders.

Rough and finished connecting rods, piston rods, crossheads, generator and extension shafts. Complete facilities for prompt delivery on all major forged or cast steel elements required in the building and powering of every type of construction.

ERIE FORGE CO.

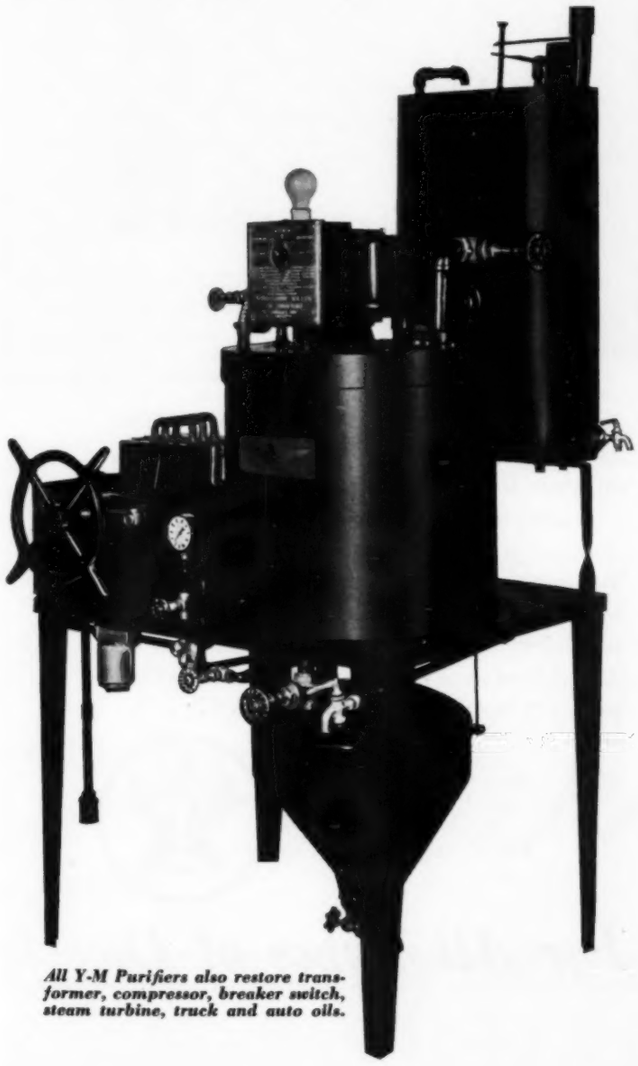
ERIE
PENNSYLVANIA

THIS Purifier Restores Color and You KNOW the Oil Is Clean

Youngstown Miller equipment brings back sparkle and brilliance to used oil by ridding it of tarry sludges—completely.

Fuel dilution, acids, water, free carbon, colloidal carbon, oxidation products, dirt and other contaminants are also removed, and in some ways the cleaned oil is even superior for lubrication purposes to the new parent oil itself.

There is noticeable freedom from stuck piston rings and crankcase deposits and much less oil consumption.



All Y-M Purifiers also restore transformer, compressor, breaker switch, steam turbine, truck and auto oils.

• *The Y-M Process is available to the smallest as well as the largest plants, in a wide range of sizes. All perform exactly alike.*

• Marketed only 7 years—yet well represented by a nation-wide roster of users in nearly every industry where lubricating oil protects costly machinery.

Used by—

5 large Diesel builders for reconditioning oils in regular testing of new engines.

U. S. Navy, Bureau of Aeronautics, at San Diego, Quantico, Anacostia and at Naval Aircraft Factory, Philadelphia.

Erie Railroad, Seaboard Airlines, Illinois Central and other railway Diesel owners.

Stationary Diesel Plants, ranging from such larger units as Grand Haven to small ice plants and similar industries.

THE YOUNGSTOWN MILLER CO.,
SANDUSKY, OHIO

Electric current available . . .

Main Engines

H.P.	MAKE	TYPE	LUBE OIL CAPACITY

Gals. drained—trucks and cars.....per mo.

Gals. other oils to be reclaimed.....per. yr.

Name.....

Address.....

.....

If you do not use coupon—please mention *Diesel Progress*

RINGS ALL FREE
. . . after months

More Diesel horse-power is lubricated in the United States with Texaco Ursa Oil than with any other brand.

AFTER MANY MONTHS of operation you'll know at first hand the remarkable results of lubricating Diesel cylinders with Texaco Ursa Oil.

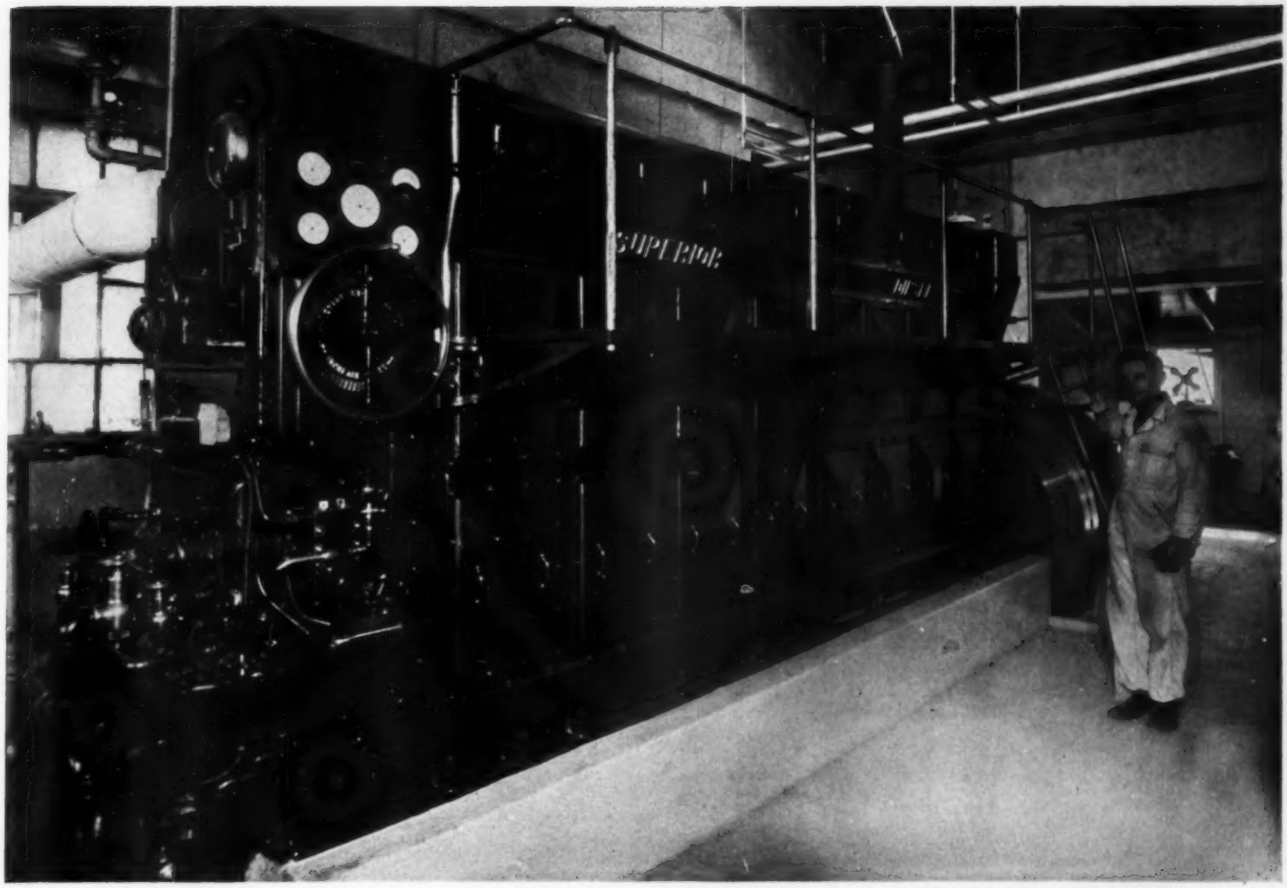
You'll find the rings free in their grooves, sealing compression so that the engine produces full power with less fuel. This engine cleanliness is due to Texaco Ursa Oil's freedom from tar and gum forming elements. What carbon forms is dry, fluffy, blows out with exhaust gases.

If you are using oil that breaks down into sludgy deposits that stick rings and valves, or burns to flint-hard carbon, you can stop this waste by switching to Texaco Ursa.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Diesel Lubricants. Prompt deliveries assured through 2070 warehouse plants throughout the United States. Ask for Texaco Ursa. You can not get Ursa results without Ursa. The Texas Company, 135 East 42nd Street, New York City.

TEXACO

URSA OILS For All Types of Diesels



Nickey Bros., Inc., Memphis, Tennessee, manufacturers of hardwood flooring and fancy and rotary veneers, have installed this 560 H. P. Superior Diesel in their power plant.

This Power Plant Efficiently Combines Superior Diesel With Steam

For years, the name, Nickey Bros., has been associated with the production of fine hardwood flooring and sawed and rotary-cut wood veneers. Prominent in their trade mark, which is well known, is the slogan "None Better".

When they determined to modernize their power plant for greater capacity and operating economy, they purchased a Superior Diesel which we believe will be a credit to their slogan.

This plant, like many in other industries, has large power and steam demands which do not always coincide. So Diesel and steam engines parallel smoothly or operate alone, each doing the service for which it is best adapted.

Power plant modernization pays, but it should not be undertaken without thought to the many uses of modern Diesel engines such as Superiors.

THE NATIONAL SUPPLY COMPANY
OF DELAWARE

SUPERIOR ENGINE DIVISION, SPRINGFIELD, OHIO

LOS ANGELES, CALIFORNIA — PHILADELPHIA, PA.

Superior DIESELS

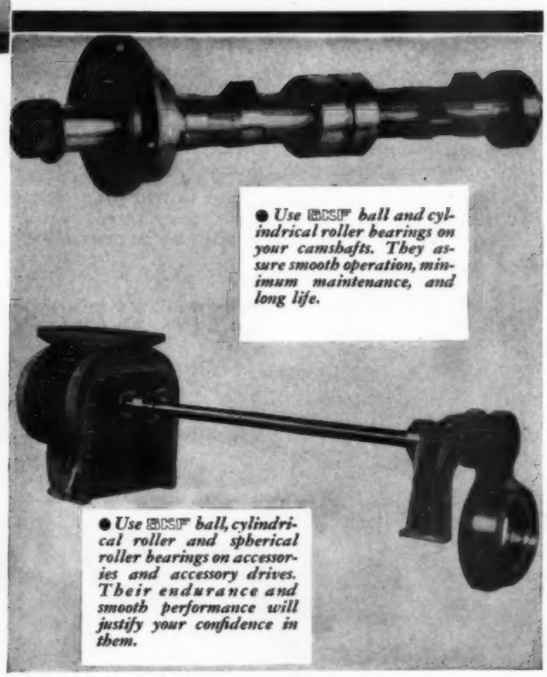
HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R.P.M. • HIGH SPEED MODELS: 15 to 150 H.P., 900 to 1800 R.P.M.

SKF BEARINGS ON *Diesels!*

THE widespread use of SKF Bearings on many outstanding makes of Diesels is the most effective evidence of their dependable performance.

Their plus-performance at low operating costs is leading a host of Diesel manufacturers to specify them for a variety of locations. Consult us for recommendations. SKF Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

3970



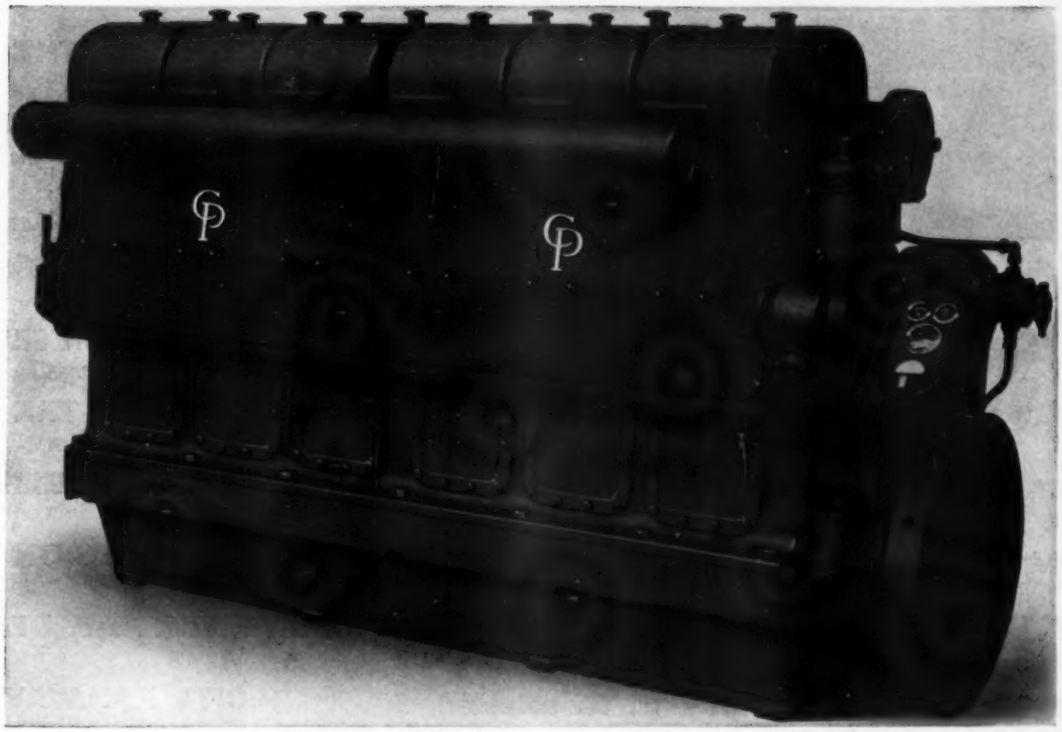
Specify SKF *for*

CRANKSHAFTS
PISTON PINS
CAMSHAFTS
ACCESSORIES

SKF

BALL AND ROLLER BEARINGS

TYPE 8 CP DIESEL



FOR CONTINUOUS HEAVY DUTY AT MEDIUM SPEED

This modern, medium speed, heavy duty CP Diesel will save CENTS on every KW. produced. For requirements from 90 to 300 H.P. this latest type Diesel has everything . . . from compact, space-saving design to a combustion control that provides a fuel economy equal to large, low-speed Diesels. All wearing parts completely enclosed . . . 100% positive automatic lubrication . . . instant starting . . . are but some of the features that make this new CP Diesel efficient, economical, dependable. Write for Bulletin 768 and learn how YOU may save REAL money on your power costs.

CHICAGO PNEUMATIC TOOL COMPANY
ENGINE MANUFACTURERS FOR MORE THAN 30 YEARS

6 EAST 44th STREET
NEW YORK · N. Y.

CHICAGO PNEUMATIC DIESELS

M-5-37

NUGENT FUEL & LUBE OIL FILTER

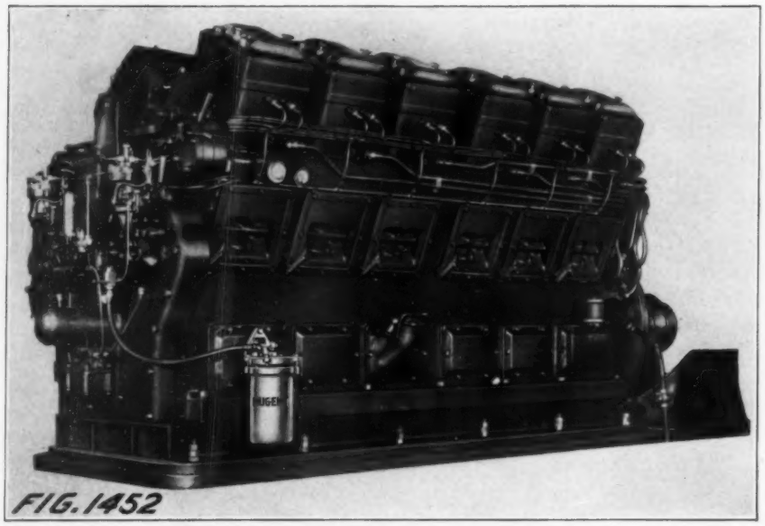


FIG. 1452

STEADY WORK DEMANDS STEADY PERFORMANCE

The Fort Worth & Denver City R. R. selected dependable Cummins Diesels for the steady grind of switching locomotives.

Cummins Diesels on this job are made doubly dependable by the installation of

NUGENT LUBE & FUEL OIL FILTERS

Guaranteed to keep the fuel for these, or any other Diesels, free from harmful dirt particles.

Remember NUGENT OIL FILTERS have twenty times more filtering area, with a proportionate increase in the efficiency, over most others.

Let us tell you more about the thousands of NUGENT installations on all types of work.

KEEPING THE

FUEL & LUBE OIL

CLEAN

ON THE TWO 500 H.P.

CUMMINS DIESELS

USED ON THE

1000 H.P. DIESEL ELECTRIC

LOCOMOTIVES ON THE

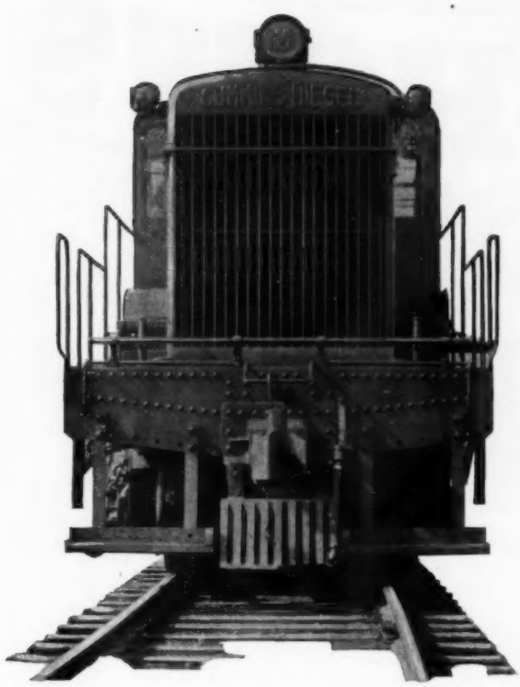
FORT WORTH & DENVER

CITY RAILWAY

FIG. 1116
CE# 4R

This Is the Nugent Filtering Cartridge for the Lube Oil

Wm. W. Nugent & Co., Inc. Mfrs.
Oil Filters, Oiling and Filtering Systems, Telescopic Oilers, Oiling Devices,
Sight Feed Valves, Flow Indicators, Compression Union Fittings, Oil Pumps, Etc.
415 N. Hermitage Ave. Established 1897 Chicago, U. S. A.



100-Ton Diesel Electric Locomotive

Powered by Cummins

for Fort Worth and Denver City R. R.

● **Designed for mixed train service, this modern 100-ton Diesel Electric Locomotive is powered by two of the latest V-type, 500 hp. twelve-cylinder Cummins Diesels, Model LV-12.**

On a test in hump yard service, at Galesburg, Ill., this locomotive took ninety cars of coal, gross weight 8055 tons, over the hump as fast as the car retarders could handle them.

Maximum cars per train handled, 117.

Total cars handled on an eight-hour shift, 633. This shift included waiting time of an hour and twenty minutes because the locomotive handled the cars faster than the retarders could take them.

Again, the extreme flexibility of the Cummins Diesel, its adaptability to the widest variety of industrial applications, is fully demonstrated. Cummins Engine Company, 2300 Wilson Street, Columbus, Indiana.

When tests are completed, this Cummins Diesel powered locomotive will be moved to Omaha and Lincoln for heavy freight transfer service. From there it will go to Denver for operation on passenger trains where it will be assigned to the Wichita Valley Division.

- The Diesel show as a form of Diesel power promotion was originated by the Hemphill Diesel Schools four years ago. Since then thousands of persons have thronged the Diesel exhibitions held annually in the Hemphill Schools throughout the country. The extensive permanent equipment of the Schools, the elaborate displays of engine and accessory manufacturers, the lectures, and demonstrations give visitors a graphic picture of Diesel principles, history, usage, and potentialities.
- Many sales of Diesel engines, Diesel-powered equipment, and accessories result from these shows. But of greater long-run importance is the understanding and appreciation of Diesel power instilled in the laymen visitors.
- The cumulative effect of these Diesel shows—and of the widespread circulation of the Hemphill Schools' Diesel-promoting literature and motion pictures—is reflected in a worthwhile contribution to Diesel sales volume . . . and will develop into a more and more powerful sales influence, as time goes by.

HEMPHILL DIESEL SCHOOLS

—located in the following cities, provide a convenient source of trained men for Diesel engine builders and users in any part of the country.

BOSTON, 110 Brookline Avenue
NEW YORK, 31-28 Queens Blvd., L.I.C.
DETROIT, 2340 W. Lafayette Blvd.
CHICAGO, 2020 Larrabee Street
MEMPHIS, 421 Monroe Avenue
LOS ANGELES, 2121 San Fernando Rd.
SEATTLE, 503 Westlake North
VANCOUVER, B.C., 1365 Granville St.

m-4-dpr

H D.S.

- Hemphill graduates command the respect of their employers throughout the Americas . . because of the careful selection of the right type student, and the system of training combining theory and its practical applications into a Diesel course unequalled anywhere.

"GARGOYLE" 8-LETTER WORD FOR CORRECT LUBRICATION

With Gargoyle Oils you get our 71 Years' Experience in making "Correct Lubrication" Boost the Profits of American Industry

How "Correct Lubrication" can save you money:

1 Curb power losses.
2 Decrease maintenance costs.
3 Improve production results.
4 Lower lubrication costs.

A MAN—and an oil drum—what's unusual about this picture? The answer is in that little red Gargoyle you see on the drum-head—

From literally thousands of industrial oil brands on the market today—this trade-mark stands out as the sign of CORRECT LUBRICATION!

Executives in 110 industries prove—in the smooth operation of their machines...in improved production ...in their account books—REAL ECONOMIES can be traced to Gargoyle Lubricants properly applied.

SOCONY-VACUUM

CORRECT LUBRICATION

GARGOYLE Lubricants

SAVES MONEY FOR INDUSTRY

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION
WADHAMS OIL COMPANY · MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA

INSTALLATION COSTS ARE LOWER

with

TYPE "S" DIESELS

The modern Type S Diesel is shipped fully assembled and is easily placed on its foundation.

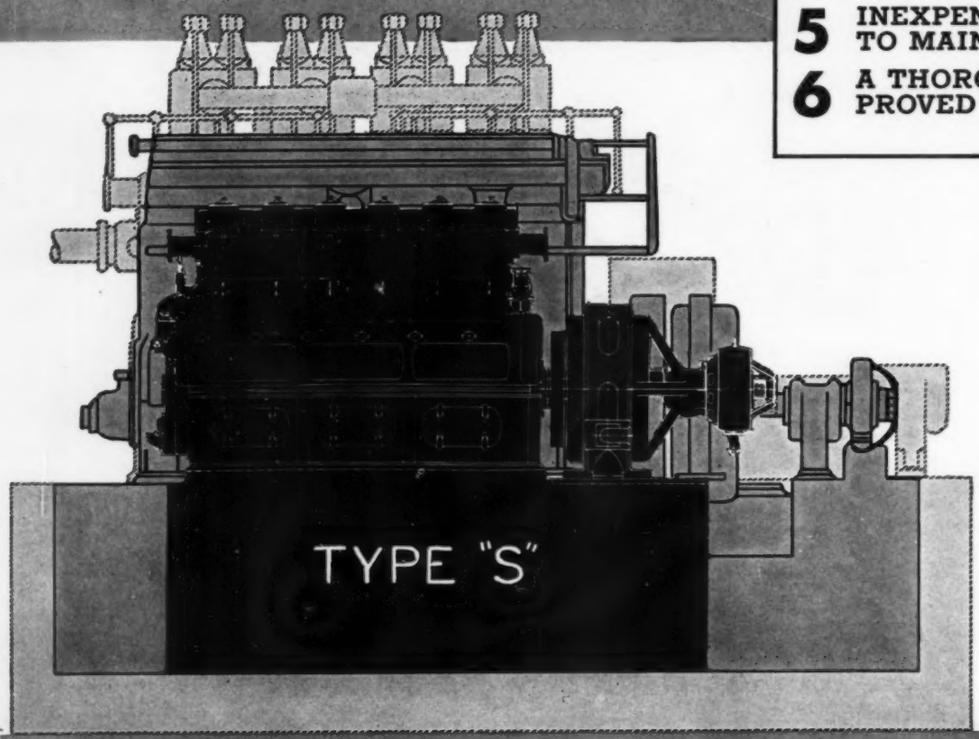
It requires about 30% less floor space, 50% less concrete and weighs 50% less than heavy, slow-speed engines.

Consequently, installation and transportation costs are materially reduced. Often a Type S engine can be installed in an existing building, whereas a heavier engine would require a building extension.

Type S Diesels are rated from 150 to 460 hp. Let us tell you more about them.

A few of the many advantages of Type S Diesels:

1. MODERN DESIGN
2. LOWER FUEL CONSUMPTION
3. LOWER INSTALLATION COSTS
4. MORE EFFICIENT POWER TRANSMISSION
5. INEXPENSIVE TO MAINTAIN
6. A THOROUGHLY PROVED ENGINE



Comparison of space and foundation requirements for a 350 hp. Type S engine and two types of heavy, slow-speed engines.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Knoxville, Los Angeles, Newark, New York, Philadelphia, Pichar, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY 477-7

For Highest Efficiency.. Lowest Operating Cost *and* 10 TIMES MORE DIESEL SERVICE HOURS

Operators of "Caterpillar" Diesel Engines and Tractors find that use of Sinclair Ten-ol gives them top performance in the heaviest service. Full engine output is maintained and lubrication troubles are practically eliminated.

Ten-ol is a new, fused lubricant developed especially for "Caterpillar" Diesels by the Sinclair Refining Company. Ten-ol prolongs engine life and cuts operating costs. It gives ten times more Diesel service hours than the finest straight mineral oil.

Order Sinclair Ten-ol, Sinclair Diesel fuel, and other Sinclair products from your local Sinclair office or write Sinclair Refining Company (Inc.), 630 Fifth Ave., New York, N. Y.

Sinclair TEN-OL is recommended as a "new outstanding Diesel engine lubricant" by Caterpillar Tractor Co.

"The Standard Lubrication Engineer was here today . . .

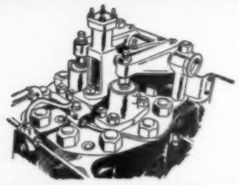
we 'stepped up' output on the Diesel"

Such conversation takes place somewhere almost every day. Not always in the power plant nor on Diesel engine operation. It may be a pump, compressor or gear reduction unit, but "the Standard Lubrication Engineer had been there . . . and suggested a saving."

That is only natural. Standard Lubrication Engineers are trained, equipped and placed at your service for the purpose of spotting opportunities to reduce lubrication costs in your plant.

Their knowledge of lubrication enables them to make these savings *safely* —without sacrificing lubricating quality or obtaining low cost lubrication at the expense of high maintenance. Their combined experience covers every phase of industrial lubrication.

You have been overlooking a real opportunity to get helpful, money-saving suggestions on lubrication if you have failed to investigate this service. It's free. Call your local Standard Oil (Indiana) office today and ask for the Standard Lubrication Engineer.



LET YOUR COST SHEETS SELL YOU NONPAREIL DIESEL OIL

These trade terms about Diesel engine oil may or may not mean anything to you—Excellent stability—Good demulsibility—Reduced carbonaceous deposits—Highly refined—Cleanliness.

These qualities, however, in Nonpareil Diesel Oils do mean something to every user—in reduced maintenance, increased power and lower lubricant costs.

Disregarding claims and counter-claims, there is only one definite way to prove this to your own satisfaction. Make a test of Nonpareil in your plant under your own operating conditions. A Standard Lubrication Engineer is ready and willing to help you make this test, then—let the *facts* on your cost sheets decide.

THE RIGHT LUBRICANT • PROPERLY APPLIED • TO REDUCE COSTS

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING

Because of Outstanding MERIT

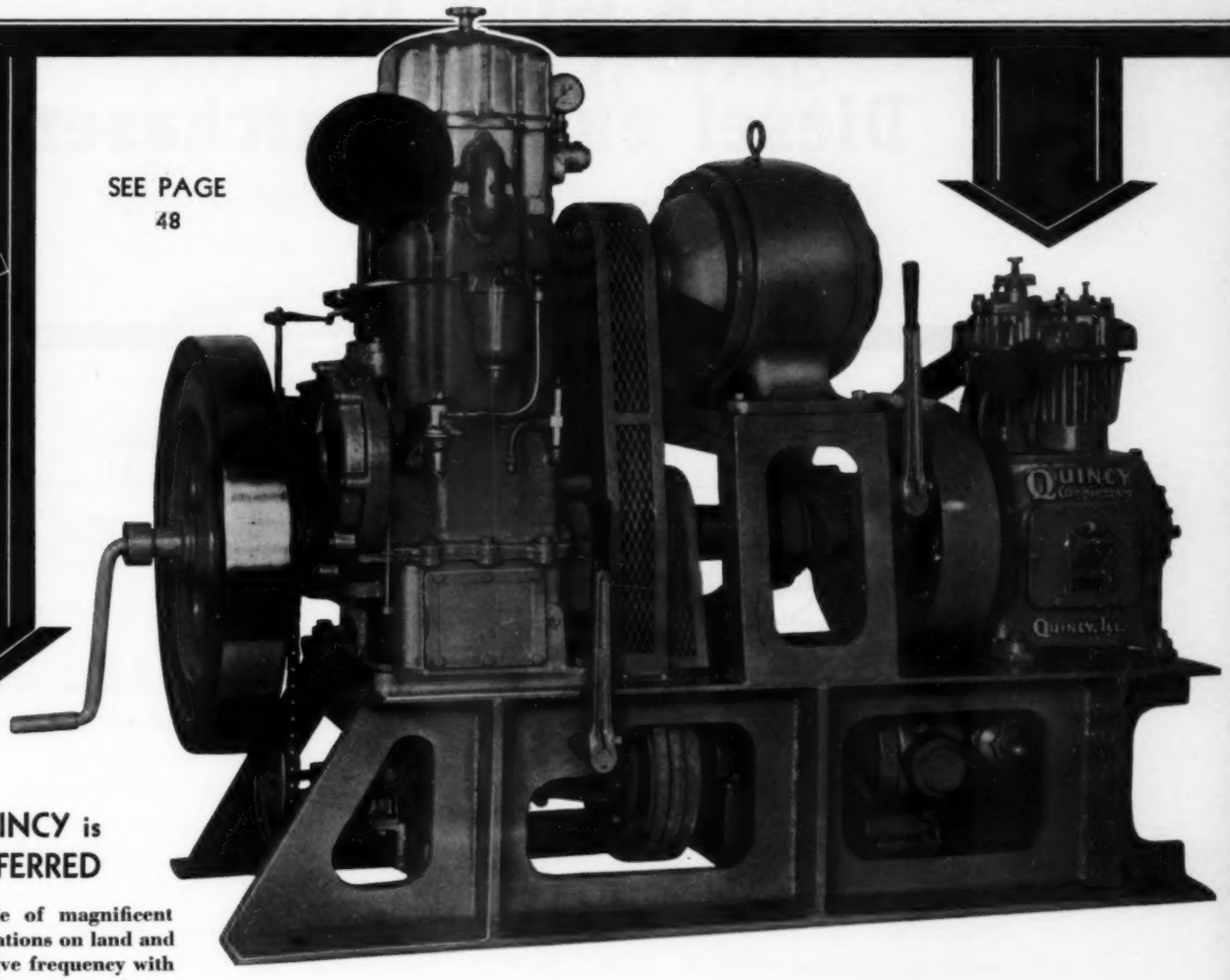
REINER DIESEL MARINE AUXILIARY UNITS

are Equipped with QUINCY COMPRESSORS

QUINCY Compressors

Best ON A THOUSAND DUTIES

SEE PAGE 48



for DIESEL STARTING QUINCY is ENGINEER-PREFERRED

WATCH the parade of magnificent new Diesel installations on land and sea. Note the impressive frequency with which Quincy Compressors are being selected as starting means. Quincy two-stage starting units are available from ¾ hp. to 7½ hp. in size, and for pressures up to 500 lbs. per square inch in both electric motor and gasoline engine drive. For further information write direct to the factory, Quincy, Illinois.

ONLY QUINCY OFFERS ALL OF THESE FEATURES

Timken Roller Bearings • Semi-Steel Pistons • Copper Finned Intercooler • Balanced Drop Forged Crankshaft • Non-Breakable Steel Valves • Perfect Circle Piston Rings • Lynite Connecting Rods • Positive Full-Pressure Lubrication • Nickel-Chrome Castings • Dust-Proof Enclosed Crankcase.

CAPTURING the fancy of shipping owners is no small achievement. But that is exactly what these reliable, all-purpose REINER DIESEL MARINE AUXILIARY UNITS have accomplished. By the score, they are going into coastal and high seas service to deliver vital stand-by performance on such duties as air supply, power and lighting and the operating of miscellaneous gear.

Quite naturally you'll find the lasting, efficient and thoroughly dependable Quincy Compressors a standard adjunct to these increasingly popular Reiner units. It's one more example of the expanding range of Diesel applications upon which Quincy, the finer air compressor, is being chosen for high merit.

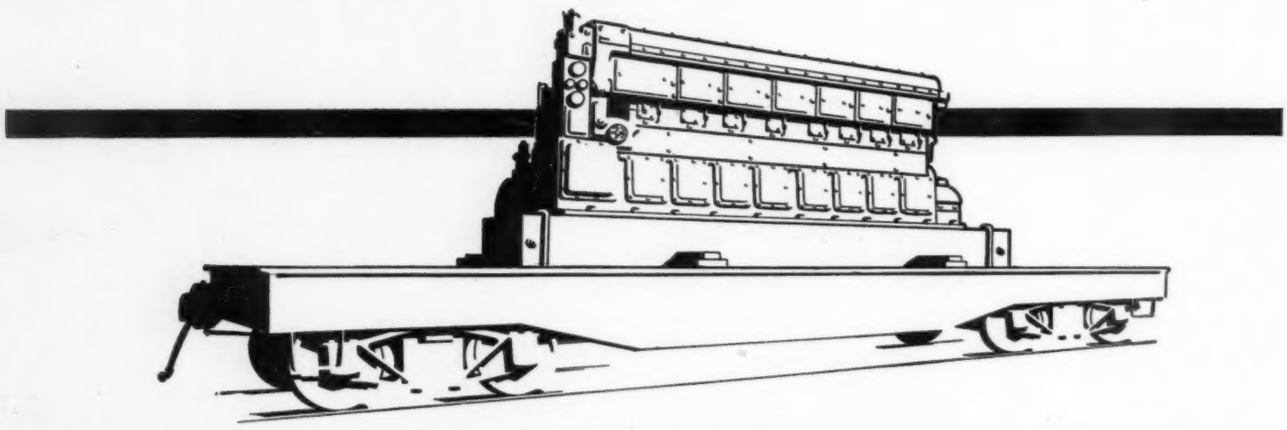
QUINCY COMPRESSOR COMPANY, QUINCY, ILLINOIS

BRANCH OFFICES at NEW YORK and CHICAGO

WHERE AIR IS IMPORTANT

QUINCY Compressors

. . . a word to the Diesel engine purchaser



• The Aluminum which the manufacturer has included in designing your Diesel engine is a certain indicator that he knows, from careful study, that immediate benefits will be derived through its use. His engineers have established by exhaustive tests that, because of Aluminum, your engine should be performing satisfactorily years hence. Here are some of the factors which merit your confidence in the manufacturer's selection of Aluminum.

Lynite pistons of Alcoa Aluminum add to engine reliability because their lighter reciprocating weight reduces bearing pressures. The superior heat conducting property of Aluminum results in more even heat distribution; by reducing thermal stresses, it minimizes the possibility of piston and cylinder head cracking.

Where it is desirable to save weight, you'll find that many of the Diesel engine parts are Aluminum; castings for the frame, bed plate, oil pan, cylinder block, cylinder heads, and main bearing caps are frequently used. Alloys of Alcoa Aluminum provide the high strength, rigidity and durability required in Diesel service. This weight saving has been accomplished economically without in any way sacrificing dependability. ALUMINUM COMPANY OF AMERICA, 2141 Gulf Building, Pittsburgh, Pennsylvania.

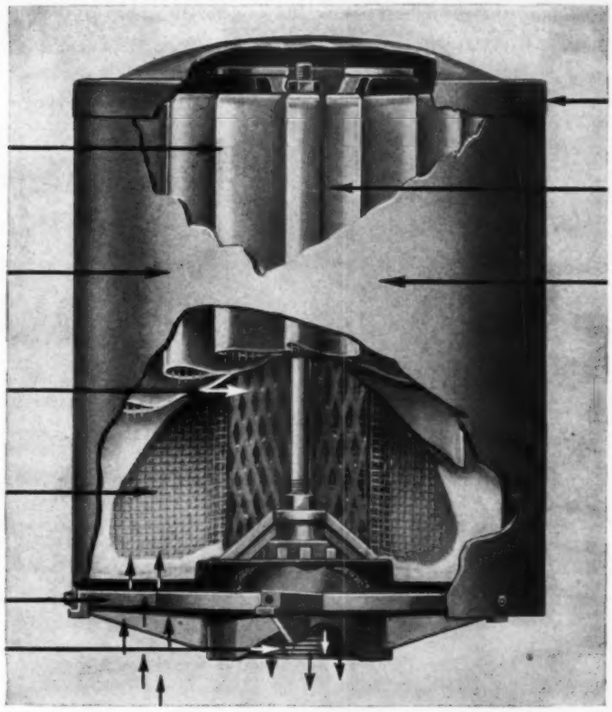
Be Sure With

ALCOA · ALUMINUM

The finest AIR FILTER ever made—
PROTECTOMOTOR

MODEL "D"

for pulsating intake on Diesels, gas and gasoline engines, compressors, etc.



Model "CPH"
Air Line Filter

For air transmission line filtration to pneumatic hoists, air hammers, drills, riveting guns, paint sprayers, etc., etc. Contains both exclusive Protectomotor features.

Exclusive Features →

RADIAL FIN CONSTRUCTION

Resists pulsation better than any known form, having no broad, flat surfaces to vibrate. Permits large area of filtering medium to occupy a small space. This means low resistance to air flow, and long filter life. No other filter has the Radial Fin Construction.

FELTEX FILTERING MEDIUM

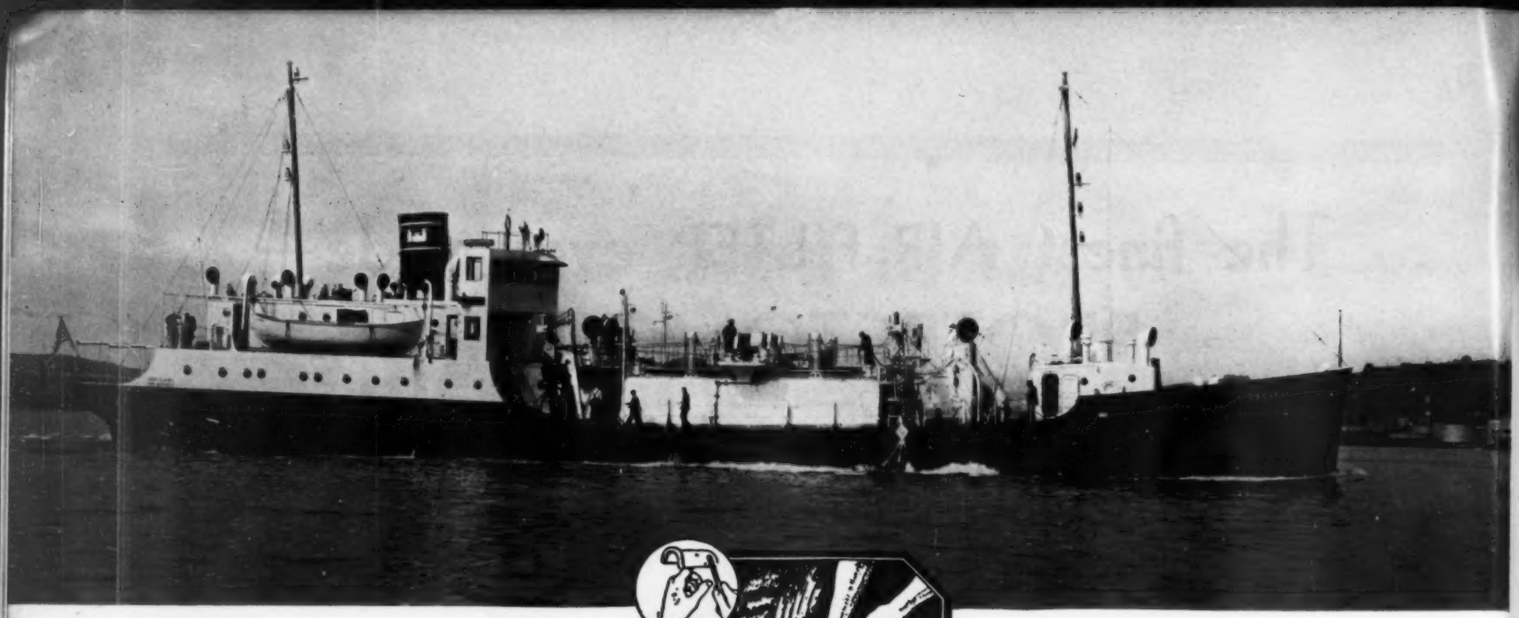
A positive dry filtration medium, exclusive in Protectomotors. Feltex in the Radial Fin Construction produces a long lasting, easily cleaned and highly efficient filter. No oil necessary. Clean, dry air is guaranteed.

ANY PROTECTOMOTOR FILTER INSTALLED FOR 30 DAY FREE TRIAL. WRITE FOR CATALOG TODAY.

PROTECTOMOTOR
REG. U.S. PAT. OFF.
99 9/10 Per Cent EFFICIENT
AIR FILTERS

MODELS FOR AIR CONDITIONING AND DUST RECOVERY ALSO MANUFACTURED BY STAYNEW.

STAYNEW FILTER CORP., 12 LEIGHTON AVE., ROCHESTER, N. Y.



United States Engineers' Hopper Dredge "PACIFIC." A new, sea-going dredge, twin screw, twin rudder, side-pipe, all steel type Diesel vessel. The five Winton engines aboard are equipped with Satco bearings.

SATCO* SHOWS ITS METTLE

as a Diesel bearing metal every time a Diesel engine goes into service. Satco was developed to meet the demands that modern power plants make on bearings — high speeds, heavy loads, compression stresses, long operating periods. The Diesel, in its everyday industrial aspect, is truly a modern power plant. And Satco is made to meet its bearing needs. Leading makers of Diesels find ample justification for their choice of Satco in the daily performance of engines fitted with Satco-lined bearings . . . and in the satisfaction of operators who put these engines to every conceivable power-production task. Satco, we repeat, means bearing satisfaction.

**A patented alloy manufactured by National Lead Company. Trade-mark registered.*

AMERICAN BEARING CORPORATION

AFFILIATED WITH NATIONAL LEAD COMPANY

INDIANAPOLIS

CENTRIFUGAL American Bearings FORCE

INDIANA

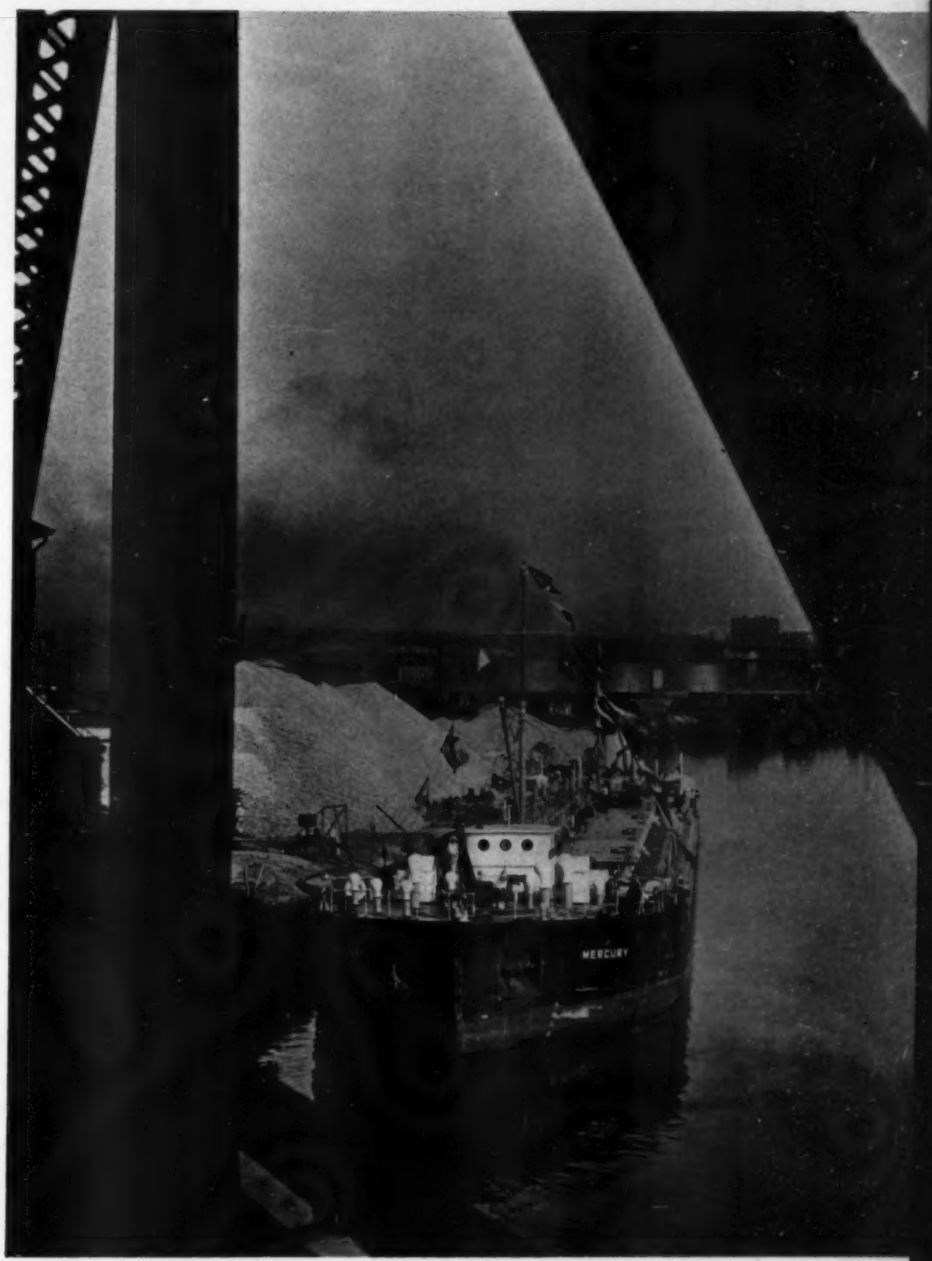
· DIESEL FILTERS ·

"Sentinel" Oil Filters for Diesel Tanker "Mercury"

ONE of the most recent and outstanding marine Diesel installations is the new 258-foot tanker MERCURY which has been placed in service on the Great Lakes. It is significant that both Winton propulsion Diesels on this splendid vessel are protected by "Sentinel" fuel oil filters.

"Sentinel" Oil Filters eliminate 100% of all water and solids to 1/10,000 of an inch and have a high efficiency to 1/50,000 of an inch. They are therefore more than just oil strainers.

When you want the best in oil filters, you will install a "Sentinel." Why not write today to your nearest representative of "Sentinel" Oil Filters. They will be glad to furnish you with information on filters for your engine.



DEALERS

O. Smith Johannsen
50 Church Street,
New York, N. Y.

Hathaway Machinery Co.
New Bedford, Mass.

Calmes Engineering Co.
215 Carondelet Bldg.
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Intermountain Diesel Sales Corp.
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(INCORPORATED)
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SENTINEL
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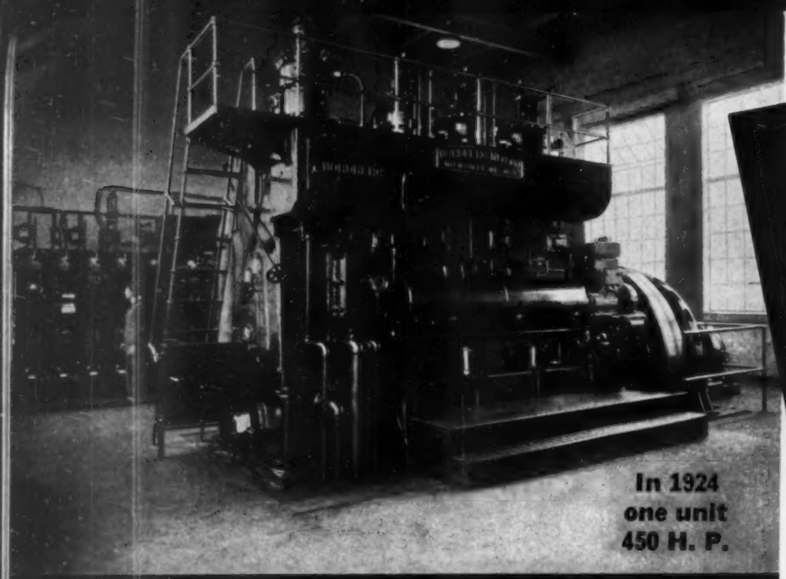
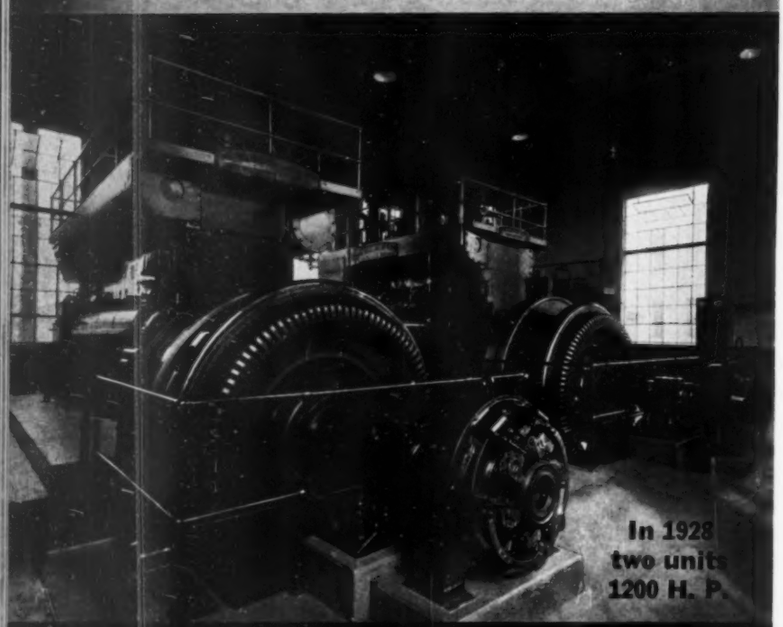
Western Sales Co.
200 Davis Street
San Francisco, Calif.

Burrard Iron Works Ltd.
231-235 Alexander St.
Vancouver, B.C.

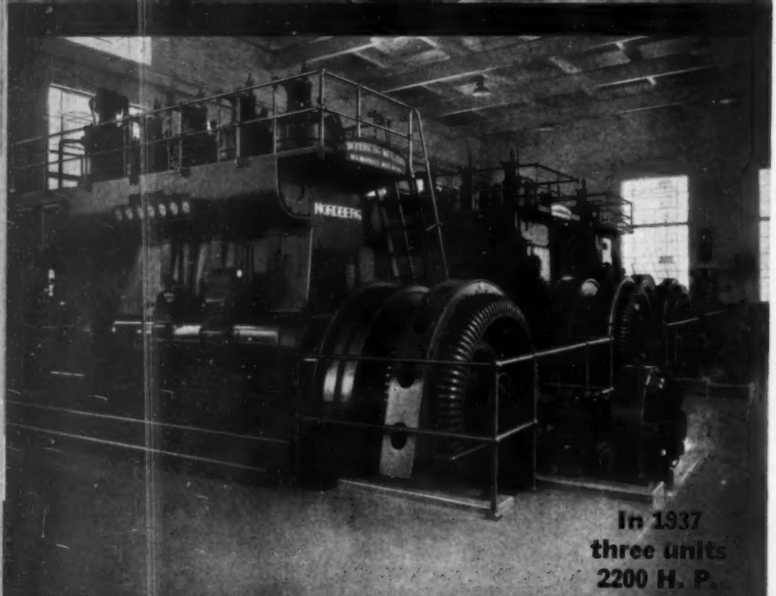
L. C. Badouin
La Paz, Baja Calif.
Mexico.



In 1924
one unit
450 H. P.



In 1928
two units
1200 H. P.



In 1937
three units
2200 H. P.

The THIRD NORDBERG DIESEL goes into service at Cedarburg

Three times over a period of thirteen years, the City of Cedarburg, Wisconsin, has installed Nordberg Diesels, being another example of a satisfied user of Nordberg Equipment. In 1924, when the change was made from steam to Diesel power, the first unit of 450 horsepower was installed. Four years later, the load had grown necessitating the installation of another engine, this being 750 horsepower in size. And, again in 1937, another Nordberg Diesel of 1000 horsepower was placed in service, giving Cedarburg a total of 2200 horsepower of Nordberg Diesels, all of the two cycle type with air injection of the fuel. For the year 1936, this Diesel-engined plant returned an operating profit to the city of $30,705.40. It is because of this kind of service that users of Nordberg Diesels continue to come to Nordberg for their subsequent purchases.

Nordberg Diesels are furnished in the two cycle type from 750 horsepower upward, arranged for either air or mechanical injection of the fuel, and of crosshead or trunk piston construction. Four cycle engines are also available in sizes from 150 to 1000 horsepower. Choose your next Diesel from this complete line.

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE

NEW YORK 60 E. 42nd St. | WASHINGTON Barr Bldg. | CLEVELAND Rockefeller Bldg. | KANSAS CITY 3560 Broadway | DALLAS 3801 Potomac Ave. | LOS ANGELES Subway Term. Bldg.

LUBRICATING FAIRBANKS-MORSE DIESELS

★ SAVES 18% ON FUEL OIL

★ SAVES 14% ON MOTOR OIL CONSUMPTION

★ REMOVES CARBON FROM PORTS AND RINGS

MICHIGAN MUSHROOM COMPANY

Packers of EXCELSIA DAWN FRESH and Mushrooms Our Lady's Fancy

NILES, MICHIGAN

April 22, 1937

Stevens Oil Co.
South Bend, Ind.

Gentlemen:

During the latter part of December our company purchased from you 2 barrels of #30 Ring Free motor oil which we put into our Diesel engine on a trial basis. Our engine is a Fairbanks-Morse, 3 cylinder, 210 horsepower, Series D32. We should like very much to give you some of the results we obtained.

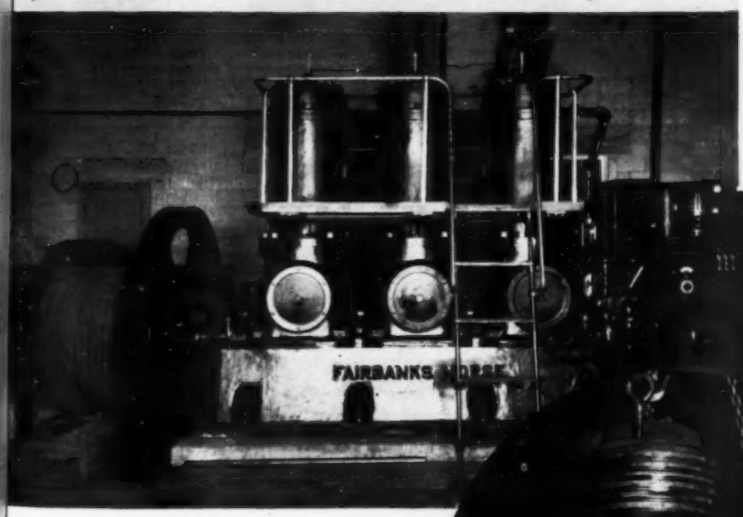
First of all our engine had been running on a partial load. We had four rings stuck and were just ready to tear the engine down for a complete overhauling. The overhaul job was put off until we had had a chance to try out the new oil. The ports were practically closed with burned carbon. On February 14th we opened up the ports and found that most of the carbon had been burned away and that we only had one ring stuck. On April 8th we tore our engine down for a complete inspection and found that all our rings had been freed and that the carbon residue had been reduced to a minimum as may be evidenced by the enclosed photograph of #3 piston.

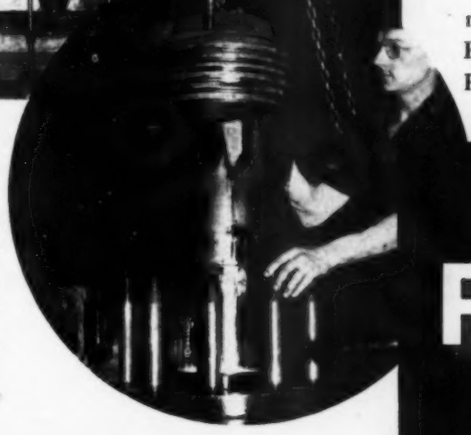
We have also made a very thorough check of our engine room records. As you know this oil cost us approximately twice as much as we were formerly paying. The following are the records from our engine room log. During the month of March we used 49,456 kilowatt hours on the basis of 11½ kilowatt hours per gallon of fuel oil used. For comparison's sake we use the month of October in which month we used 49,788 kilowatt hours for which period we produced 9.58 kilowatts per gallon of fuel oil. In other words showing us a saving of 16% on fuel oil alone. We also showed a saving of 14% in oil consumption.

We are more than ready to put in black and white that the oil has more than proved what has been claimed for it. Due to the adverse condition under which we put this oil into our engine the writer feels that any Diesel operator giving this oil a trial will find that it will do the same for him as it has done for the writer. Wishing you great success, we remain

Yours very truly,
MICHIGAN MUSHROOM COMPANY
By J. P. Peterson

vep/ann





● The 3-cylindered, 210-horsepower Series D-32 Fairbanks-Morse Diesel owned by the Michigan Mushroom Co.

● Here is the piston mentioned in the letter above. In December, 1936, this piston was badly caked with carbon. Macmillan RING-FREE Motor Oil was then put in the motor. On April 8th, 1937, after 4 months of uninterrupted but constantly improved service, the engine was torn down for inspection and this picture was taken. RING-FREE had cleaned away the carbon and freed the rings.

Actual performance records like this show exactly what you can expect from Macmillan RING-FREE Motor Oil in your internal combustion motor.

Your local Macmillan Man can and will prove many more interesting money-saving facts about this remarkable lubricant. Have him show you the seven RING-FREE tests, featured by Macmillan, that PROVE by comparison which motor oil is best.

MACMILLAN RING-FREE MOTOR OIL

1. GREATER FILM STRENGTH
2. HIGHER HEAT RESISTANCE
3. LONGER CLING TO METAL
4. FASTER PENETRATION
5. REMOVES HARD CARBON
6. IS NOT CORROSIVE

MACMILLAN PETROLEUM CORPORATION
530 West 6th Street, Los Angeles, Calif.; 50 West 50th Street, New York, N. Y., and El Dorado, Ark.

A SHOVEL CAN'T WALK 46 MILES TO WORK WITH PAPER HORSEPOWER...

A 190 hp. Model 6-EKH Waukesha-Hesselman Oil Engine powers this Link-Belt K-48, 2 cu. yd. Speed-o-Matic Shovel in the service of the Stonewall Gold Mining Company in Montana.

It takes REAL HORSEPOWER

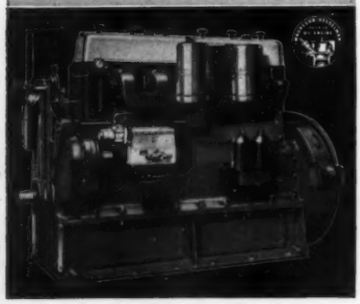
TO CROSS THE CONTINENTAL DIVIDE

Before this Link-Belt shovel could go to work digging placer gravel, it had to take a 46-mile walk under its own power from Silver City to the mine on Stonewall Creek at Lincoln, Montana.

This meant crossing the Continental Divide—6,600 feet above sea level—over narrow, winding roads—up steep hills—around a dozen bridges. And then there was that deep creek at Woburn. Shovels had crossed it before—but only with cable block and tractors. But the Link-Belt service man knew his shovel . . . and he had confidence in its Waukesha-Hesselman Engine. It took the shovel down a twelve-foot bank and up a shale rock slide on the other side—a forty-degree angle up and a ten-degree angle sidewise—and made it across in twenty-five minutes.

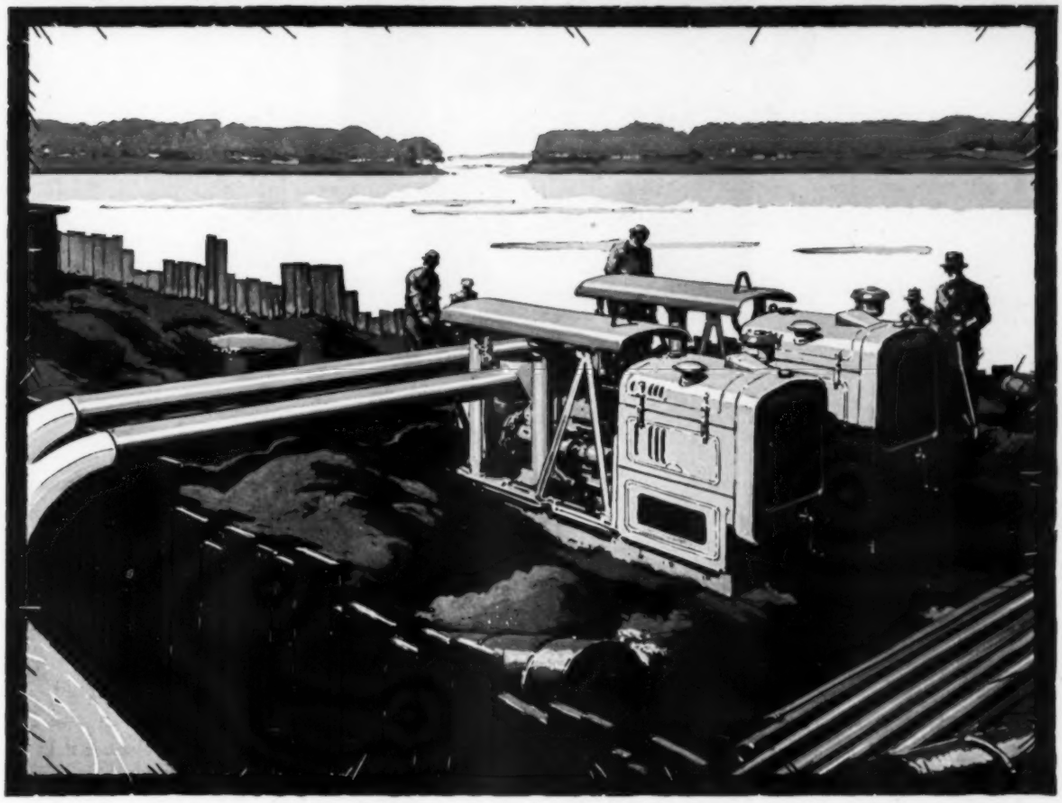
Whether it's going to the job on the roughest road—or on the job with the toughest digging—the Waukesha-Hesselman is *all* real horsepower, *not* paper horsepower. A low compression, solid injection oil engine, with precisely timed electric ignition, it burns low cost, high speed diesel fuels. Upkeep is lower than with high pressure Diesels. *Write for Bulletin 918.*

WAUKESHA ENGINES



WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK • TULSA • LOS ANGELES

HERCULES DIESELS POWER PUMPS ON GOVERNMENT LOCK AND DAM PROJECT



Six Moretrench pumps powered by Hercules "DJXC" Diesel Engines are speeding work on the new LaGrange Lock and Dam Project at Beardstown on the Illinois River. For high-speed, heavy-duty work of this kind which requires efficient, economical and dependable performance at all times, Hercules has established recognized leadership. Unlike many Diesels, designed primarily for only one type of application and limited by speed and weight, the Hercules Diesel combines a wide speed range, minimum weight per horsepower, flexibility and clean combustion. These are the principal reasons for the preference given Hercules Diesels by manufacturers of commercial vehicles, power boats, industrial, agricultural and oil field equipment. The broad line of Hercules Engines and power units, both Gasoline and Diesel, includes a model to meet every power requirement.

Hercules Marine Diesel Engines supplied by Kermath Manufacturing Company, Detroit, Michigan

HERCULES MOTORS CORPORATION, CANTON, OHIO

America's Foremost Engine Manufacturer

Power Plants from 4 to 200 H. P.

HERCULES DIESEL **ENGINES**

NO. 8 OF A SERIES

"ENGINES are made faster than men"

Demands for mechanical power are more rapidly met than demands for man power and supervision. Diesel Engines come off the production lines in many plants. Output can be speeded up to satisfy orders, but Diesel operation is another matter. Comparatively new, highly specialized, and widely diversified, the operation and maintenance of Diesel Engines requires trained men. Public schools offer little or no training in this line. Collegiate technical schools and universities may provide the academic and theoretical exposition of Diesel principles, but this again is inadequate.

What the Diesel industry needs is trained men fully capable of handling any Diesel job in the field — men who have been in shirt-sleeve contact with hot and cold engines in actual service — on construction jobs, on boats and railroad locomotives — on tractors, trucks, buses — in light and power plants and general industry.

Men of this calibre graduate from National Schools, fully equipped by daily training over sufficient periods of time in the million dollar shops of National Schools. Years ago the founders of National Schools foresaw the advancing adoption of Diesel Engines for manifold uses. They visioned the increasing need for able men to operate, supervise and service these engines. With no other source of specialized Diesel training in existence, National Schools organized its now famous Diesel courses, and in the interval has adequately trained thousands of men and seen them placed in positions of responsibility and good income. Nowhere else in America — or in the world — can be found such facilities in shop equipment or such a faculty of Diesel experts who are at the same time educators, as at National Schools in Los Angeles.

National Schools were established in Los Angeles in 1905 — have continued without interruption under the management of its founders, with a definite policy of honesty, sincerity and worthiness of purpose. Today, National Schools, representing a million dollar investment, offer sound, thorough instruction courses in Diesel and Gas Engine work, Radio and Electricity.

NATIONAL SCHOOLS

4000 South Figueroa Street • *Los Angeles, California*

[PIONEERS OF PRACTICAL TRAINING FOR 32 YEARS]

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION – Caterpillar D-8800 Diesel engine powered Lorain shovel moving 100 yards of dirt per hour on a Rosslyn, Virginia road contract. Familiar buildings of the nation's capital appear in the background.

TABLE OF CONTENTS ILLUSTRATION – The new United States Army Engineers' Dredge *Pacific* powered with five Winton Diesel engines. A complete editorial description of this vessel with both exterior and interior illustrations will appear in DIESEL PROGRESS for November.

DIESEL PROGRESS for October, 1937, Vol. III, No. 10. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U. S. A. and Possessions $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

CONTENTS • OCTOBER

DIESELS AND THE FARM CONTRACTOR

At Reddick, Illinois, this "Caterpillar" 35 hp. Diesel tractor is at work baling straw from windrows following the combine. The owners of this machine are farm power contractors in addition to operating more than 1,000 acres of their own. Many of their neighbors are anxious to rent this economical, dependable tractor and there are multitudes of year-round jobs to keep the tractor busy.

OF all the industries that have responded to the development of the Diesel engine, and that have profited by the economies that this type of power afford, none has benefited more noticeably than that of agricultural contracting.

Farm power contracting is a business almost as old as the business of agriculture. In 1931, however, this business received a new impetus and was completely rejuvenated when the first successful Diesel powered tractor was introduced in the United States. It meant that the contractor could cut his prices as much as 50 per cent in some localities and still make a comfortable profit. It meant also that the small farmer could afford to pay to have his heavy work done, and need not, as a consequence, invest in unnecessary heavy machinery. The farm power contractor saw and took advantage of this opportunity.

In many portions of the country the present trend is toward the purchase of small, one or two plow tractors as a means of replacing horses on the smaller farms. These machines, practically speaking, have very little more peak capacity on heavy work than have teams. During the plowing and harvesting seasons, and at all peak times of the year, the jobs are too numerous and too heavy for these small tractors.

It is during these seasons that the development of the Diesel has enabled the farm power contractor to become a neighborhood necessity in many places. The larger Diesel outfits that he employs are called in to level these peak loads. They do the work well and, in addition, do it cheaper than the small farmer could do it himself.

In the corn belt and wheat belt states, Diesel power has enabled the farm power contractor to develop his business to an unprecedented point. In some cases, it has assumed the proportions of "big business." At Reddick, Illinois, for instance, four brothers farm about 1,100 acres of their own. They own five "Caterpillar" track-type tractors, however, and do extensive contract work, in many cases saving a neighbor's crop or getting the seeds planted promptly when untimely rains or snows make the fields almost impassable. The drawbar and belt jobs that keep these particular contractors busy the year around include plowing, making seedbeds, combining grain, bailing hay, filling silos, pulling hedge, combining soybeans, sawing wood, chopping feed, deep tillage work, operating threshing machines and spreading straw stacks.

Throughout the United States the Diesel powered track-type tractor has opened the farm power contracting profession to the farm youth. Frequently the farm home does not offer enough work to keep the sons of the house busy. Often, however, the farmer is willing to set his sons up in a business of their own.

An example of this is at Tremont, Illinois, where two brothers announced their intention of going into business and purchased a Diesel tractor. Their home farm didn't keep them

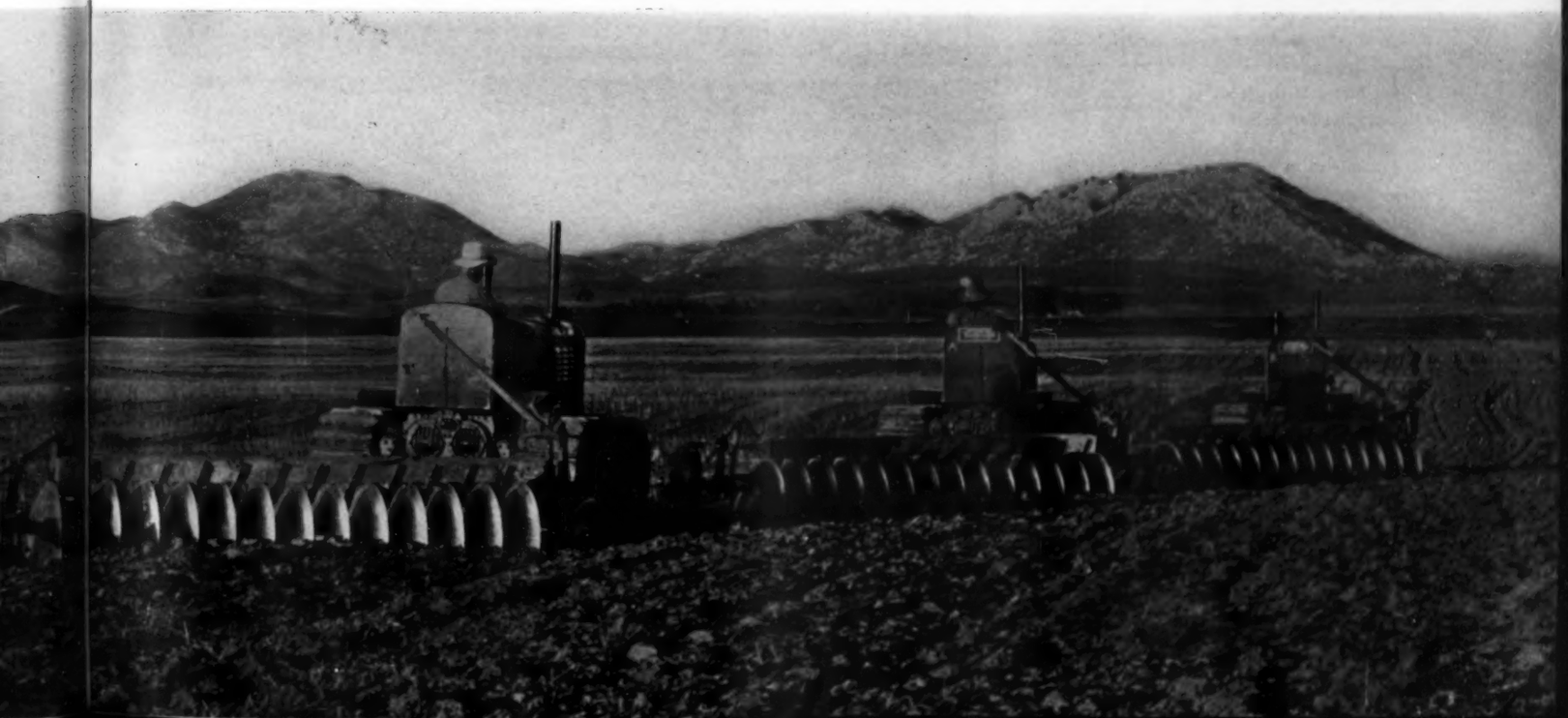
Mr. Yoder makes use of 10-foot harrow-plows to prepare the seedbed, and these are shown being operated by the three TD-40 crawler tractors in one field. Plowing is most efficiently performed during a short, rainy season that usually begins about November 1, and so Mr. Yoder then operates the three TracTracTors day and night in 8-hour shifts. The tractors are also operated day and night at seeding time when each TracTracTor pulls a 10-foot harrow-plow and drill in tandem fashion.

Among the outstanding grain growers near Hemet, California, is M. J. Yoder, who works three TD-40 TracTracTors, frequently day and night, to farm 8,000 acres. Last season one-half of the 8,000 acres was in summer fallow and the remainder in barley, wheat and oats. Two hillside harvester-threshers, operated by Diesel tractors, are shown in a 300-acre field in the illustration. The camera tended to smooth out the steep dips in this field, so its extreme roughness is not very well shown.

busy, but they found plenty of work to do in the farm power contracting business. During their first year, they plowed more than 1,500 acres, worked helping a local contractor spread gravel on a township road, purchased a corn picker to help pick neighbors' corn, and did many other jobs – all at a profit to themselves and to their clients.

On the Pacific Coast, in California particularly, the farm power contractor has been quick to take advantage of the economy of Diesel power. Here agricultural contract work has reached the highest stage of development. In these areas, where there are countless, profitably run small farms, there are many contractors who do not operate an acre of their own, but make a comfortable living entirely by contract work. The length and breadth of the state, the farm power contractor with his economical Diesel power, is relied upon to get the heavy work done at the time it should be done.

The diversification of jobs that this currently growing business finds is practically unlimited.



"Caterpillar" Diesel RD4 pulling 5-16" John Deere plow, summer fallowing 22½ acres per 10 hour day on 2¼ gals. 8c Diesel fuel an hour. This owner farms 700 acres of his own land and does contract work besides.

The farmer with a Diesel tractor may apply his machine to a neighboring logging operation, skidding logs or using belt power to operate a sawmill. In the South, the contract farmer is frequently employed in the construction of terraces. Some devote their entire time to soil conservation work, even applying their inexpensive power as an assistance to the United States Department of Agriculture Soil Conservation Service.

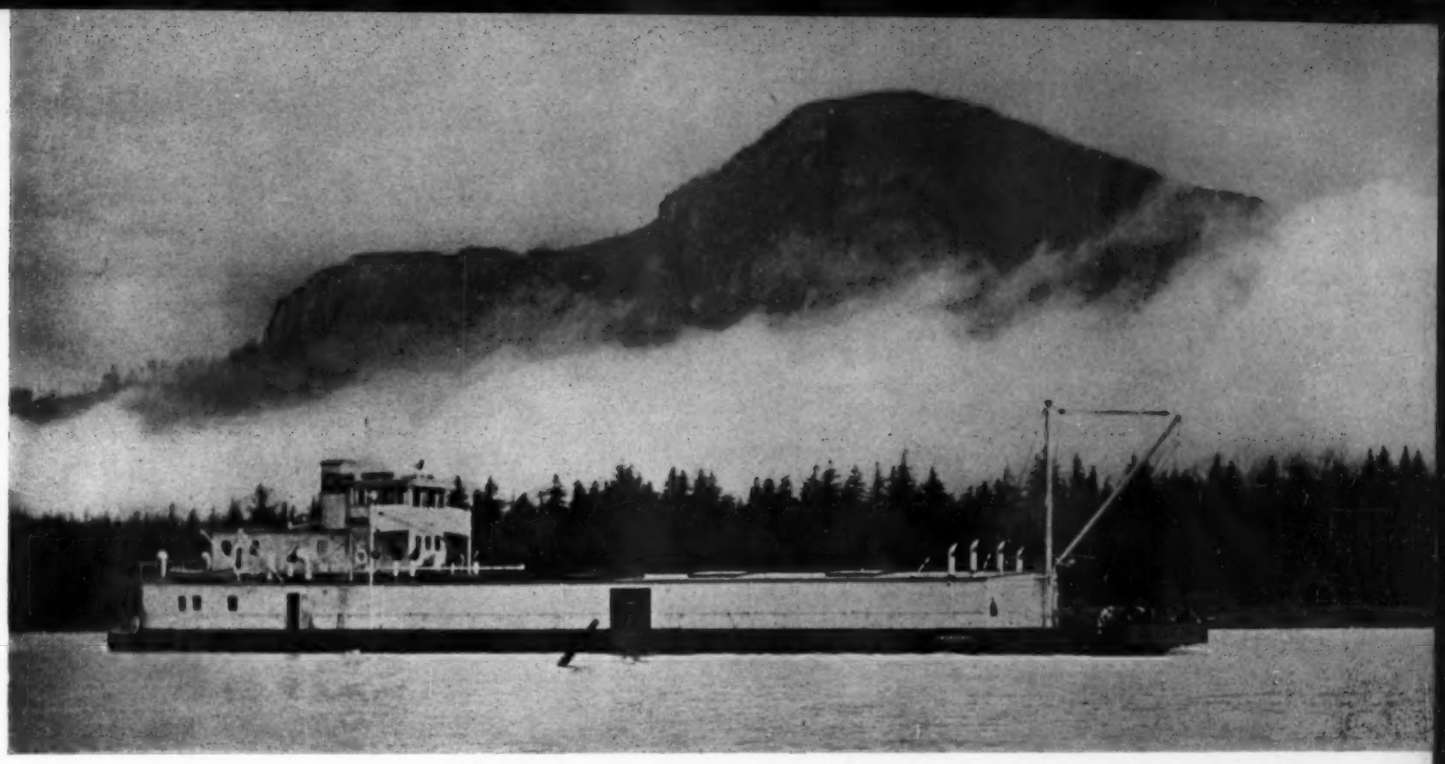
An example of the service that the Power Contractor can offer the Soil Conservation Service of the U. S. Department of Agriculture, is at Kismet, Kansas, where Louis S. Lemit operates a "Caterpillar" Farm Diesel Tractor. He follows a government terracing outfit, pulling a seven-base lister over the completed terraces to rough the soil. Burning only two gallons of 7½ cent fuel per hour, Mr. Lemit can cover 40 miles of terrace in a day. He keeps up with four big Diesel tractors and graders, which are employed by the Conservation Service.

The top soil of the terrace ridge, when dry and powdery, is capable of offering little wind resistance. It is for this purpose that Mr. Lemit's outfit is employed. The lister turns up heavy clods which anchor the soil and prevent it from blowing. Moreover, the listed ridges aid in the catching and conservation of rainfall.

In Hale County, Alabama, there is another interesting example of cooperative soil conservation work. Here, with the soil badly eroded, and no equipment large enough to tackle the job, farm residents of the county banded together to form the Hale County Soil Conservation Association, Inc. From a single Diesel tractor and terracer outfit, they have increased their equipment until today, there is almost $25,000 worth of Diesel tractors, graders, angledozers, and Diesel-powered tractor-mounted draglines working for the Association. There have been about 24,000 acres of land terraced in the county, and the association has 250 members. It is not uncommon for the equipment to work day and night, and all machines are equipped with electric lights for this purpose. In spite of the fact that there are a half-dozen big Diesel tractors working, operating costs remain so low that with labor costs included, the association need charge less than $5.00 per hour for its work.

By bringing economical power to the agricultural contractor, the Diesel engine has provided United States agriculture with a method of crop assurance through cooperation that was previously undreamed of. Throughout the country today, agricultural authorities are almost unanimous in agreeing that farm power contracting is a definite need. The business of farm power contracting itself is proving its need by its continued rapid growth.

Relatively small compared to the 16½-foot combine, this Diesel tractor has ample power to harvest 4½ acres of 30 bushel wheat per hour at a fuel cost of less than ten cents.



"INLAND CHIEF"

World's First Freighter-Tanker for Navigation on Upper Columbia River

By CHARLES F. A. MANN

COMPLETION of the unique all-welded, steel tanker-freighter *Inland Chief*, for service on the Columbia River above Portland, marks the entry of a unique new design of river vessel destined to completely change inland waterway navigation throughout the world.

With petroleum products forming a rapidly increasing tonnage cargo on inland waterways for one-way haul, and the downstream haul of bulk cargoes likewise increasing rapidly, it has remained for the Inland Navigation Company to design a unique Diesel vessel that permits capacity loading BOTH WAYS, thus opening the way for a rapid development of a new and original American ship type.

The *Inland Chief* was designed by Gus Kobrow and built at the plant of the Western Engineering Company of Seattle, of entirely electrically welded steel construction, and recently sailed to the Columbia River to reopen the historic Mid-Columbia ship route past the new Bonneville Dam and to The Dalles, Ore. Later the vessel will operate with a fleet of steel barges through the nine-mile Celilo Canal and on to Pasco, Wash., some 350 miles inland from the Pacific at Astoria. Petroleum products moving upstream will be transferred to tanker trucks to complete the haul to the Spokane territory, while wheat, wool, fruit and canned goods will move downstream.

The *Inland Chief* is 190 x 38 x 9 ft. depth and 7 ft. loaded draft, with a capacity of 300,000 gallons as a tanker, stored in the cellular bottom part of the hull, or 800 tons of bulk wheat in the 110 foot steel deck warehouse atop the tanks.

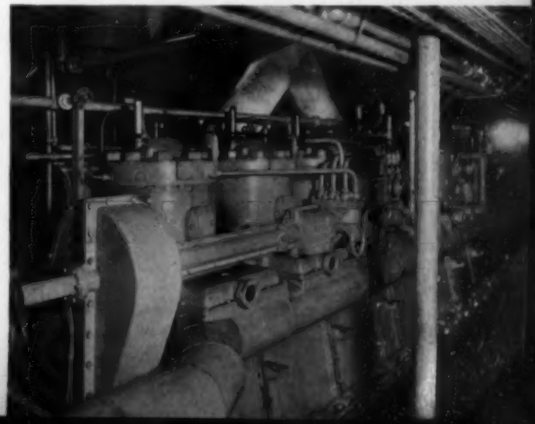
Basically, below the main deck the entire 110 feet of length beyond the engine room is designed like a tanker, having a flat bottom, no keel and a perforated diaphragm running longitudinally through the midpoint of the hull, from deck to bottom, and two steel longitudinal trusses on each side of this center piece, about half way between the center and the outer edges of the hill. Quarter inch or better steel plate is used throughout. Welding every joint and seam and the use of hundreds of L shapes for reinforcement of bulkheads and sides gives a vessel of unusual strength.

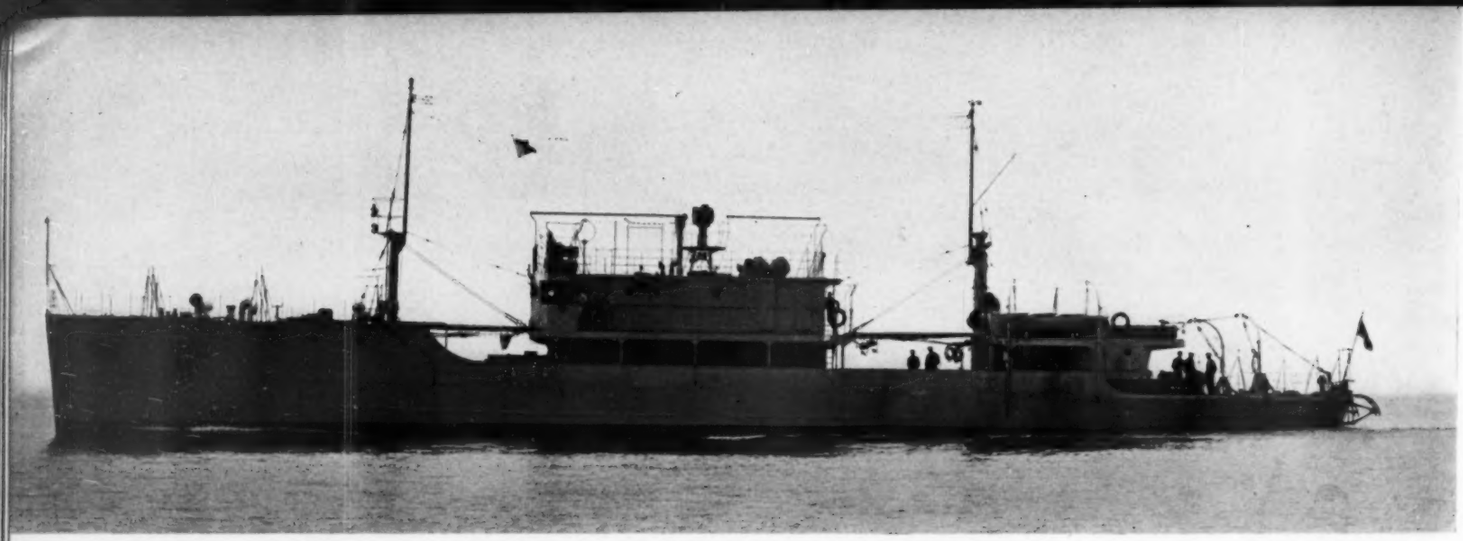
Two Johnson rebuilt Diesel engines are located aft, and were built by the Johnson Manufacturing Company of Seattle. They are 6 cylinder 2 cycle units, developing 550 hp. at 660 rpm. The engines have cylinders 14½ x 14¼ and are scavenged by a Roots scavenging blower belt driven with an Allis-Chalmers V belt drive off the main crankshaft. Each engine swings a 60 x 42 inch three-bladed propeller, giving the ship a speed of 11 knots at 400 rpm. All fuel, lubricating and oil pumps are driven off the main engine and the six individual fuel pumps of the injection system are located in the center of each engine. Pistons are oil cooled and each engine carries an air compressor for starting, operating the old-fashioned type deck winch and the pneumatic, multiple rudder steering system. Two Ford V8 engines operate auxiliary lighting plant, air compressor, two oil cargo pumps and bilge pumps. Pilot house control of engine and rudder is also fitted.

Crew's quarters for 14 and a roomy saloon, galley equipped with oil burning range, electric refrigeration, etc., are located on the second deck aft, beneath the pilot house and flying bridge.

The 110 foot deckhouse for freight is, in effect, a continuous steel warehouse, with side doors and roof hatches for bulk wheat loading. Her Mississippi type blunt bow is equipped for towing a nest of river barges.

Engine room view of the "Inland Chief."





Siamese Navy mine layer built at Trieste and powered by Fiat.

MARINE DIESELS IN ITALY

By ANTONIO GIORDANO

MARINE Diesel propulsion has had interesting applications in Italy in the course of 1936, and so far during 1937. In addition to the re-engining of the M.V. *Saturnia* and the M.V. *Vulcania*, and to the accomplishment of the M.V. *Batory*, the Cantieri Riuniti dell' Adriatico have fitted Fiat Diesel machinery built at the Stabilimento Grandi Motori Fiat at Turin on the M.V. *Lero* and on the M.V. *Loredan* built to the order of the Compagnia Adriatica di Navigazione for their Adriatic and Mediterranean passenger and freight services. On the M.V. *Lero* are two Fiat engines. Each main engine has the following built-in auxiliaries: fuel pump, double acting scavenging pump, sea water cylinder and piston cooling pump, forced lubrication oil pump and oil pumps for cylinder lubrication.

In the M.V. *Lero*, as in the case of her sister ships, the following auxiliaries have been installed: Three electric generating sets consisting each of a 100 hp. five cylinder Diesel engine working on the single acting two stroke principle with mechanical injection coupled, on the same bedplate, to an open type air cooled electric generator of 55 kw. at 200 volts and 600 rpm. In addition, on these vessels there is an emergency set consisting of a Fiat three cylinder, four stroke solid injection engine of 35 hp. at 1,000 rpm. directly coupled to an electric generator of 22 kw. To the engine is connected by means of a flexible coupling a Fiat air compressor having the capacity to compress at a pressure of 30 kg. per square centimeter a volume of air of about 10 cubic meters per hour. There are, furthermore, three Fiat type air compressors of a capacity of 60 cubic meters of air per hour operated with electric motors.

Engines of the same type, though of smaller power, have been fitted also on the M.V. *Loredan* built at the same yard for the same shipowners, but there is no doubt that the most interesting work is represented by the re-engining of the M.V. *Città di Bari*, the M.V. *Rodi*, the M.V. *Egitto* and the M.V. *Egeo* of the Compagnia Adriatica di Navigazione, and the M.V. *Fella*, the M.V. *Cellina*, the M.V. *Feltra*, the M.V. *Rialto*, and the M.V. *Leme* of the Navigazione Libera Triestina and employed on the North Pacific service. All these vessels, as the fruit carriers order by the Italian banana monopoly from the C.R.D.A. and from the Ansaldo Shipbuilding Company will be provided with Fiat Diesel engines built at the Stabilimento Grandi Motori at Turin, which can be considered as the result of the outstanding success of the engines provided by the Fiat on the M.V. *Vulcania*.

The re-engining of the nine vessels has a considerable importance, as it should be noted that at present four stroke engines are fitted on these vessels and that they are to be replaced by two stroke engines to which the Fiat has exclusively adhered since 1909.

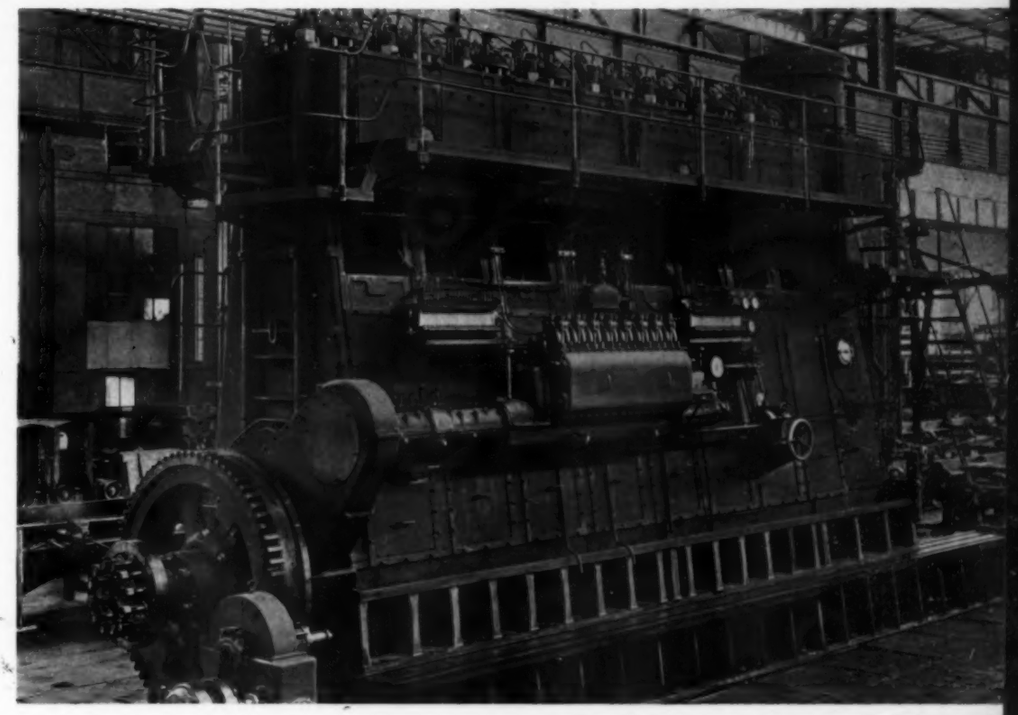
In order to have an idea of the importance of the work to be carried on it may be interesting to consider the following figures regarding the vessels in question:

	Gross Tonnage	Old Engines	New Engines
Egeo	3150	B.&W. 2300 hp.	Fiat 5000 hp.
Egitto	3150	2300 hp.	5000 hp.
Città di Bari	3150	2300 hp.	5000 hp.
Rodi	3150	2300 hp.	5000 hp.
Fella	7061	3300 hp.	5800 hp.
Cellina	7061	3300 hp.	5800 hp.
Feltre	7400	3300 hp.	5800 hp.
Rialto	7400	3300 hp.	5800 hp.
Leme	8108	Tosi 2500 hp.	7200 hp.

The application of Diesel propulsion in Italy has made considerable progress also in respect to the orders secured by Italian shipbuilders from foreign shipowners, but there is no doubt that both the three motor gunboats built at the Cantiere di Ancona of the Cantieri Navali Riuniti to the order of the Uruguayan Government, and the two motor mine layers built at the Monfalcone yard of the C.R.D.A. at Trieste may be considered as interesting achievements of marine engineering, since, as a matter of fact, it has been the employment of Diesel machinery which has made possible vessels with a large radius of independence and comfortable quarters for officers and crew at the same time. In general in gunboats employed both for military, custom, police, etc., purposes much space has to be devoted to officers and crew accommodations and to bunkers as the number of crew is rather large and the radius of independence must be high so that it becomes necessary with the employment of steam engines to reduce the engine room space and consequently the power

and the speed of the machinery. In the cases of the Uruguayan motor gunboats, instead, by the employment of Diesel machinery, it has been possible to insure high speed. As a matter of fact, a trial speed of over 17 miles per hour has been reached.

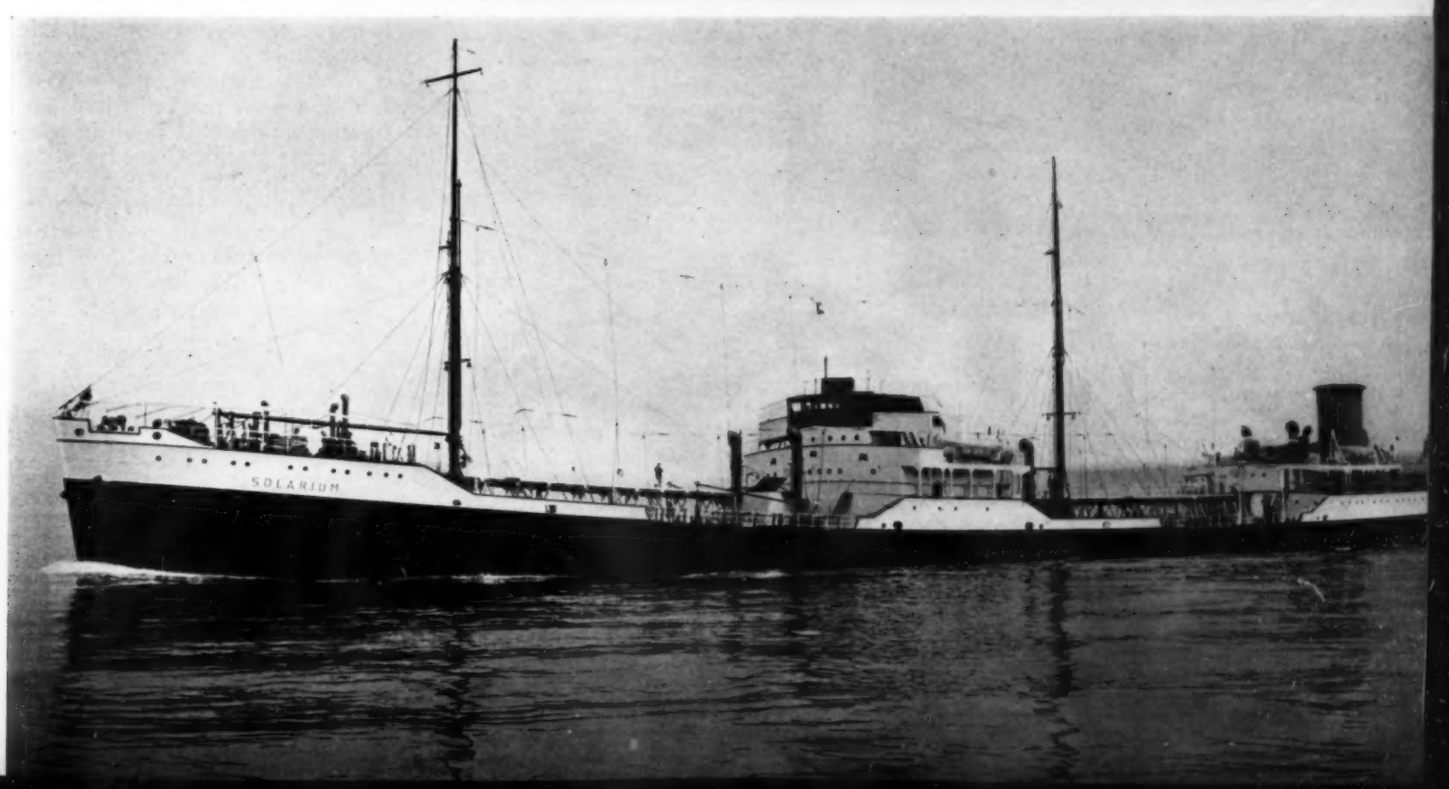
What has still more importance is the fact that the application of Diesel machinery in regard to foreign tonnage still continues as the new tanker ordered by the Anglo-Saxon from Monfalcone is to be provided with Werkspoor engines, while the two 15,000 tons carrying capacity tankers ordered from Monfalcone by the Socony Vacuum Oil Co. are to be provided with a Fiat single acting two stroke engine of 3,600 hp. at 110 rpm. each. It is claimed that the price paid for such vessels is 15 million Italian lire each.



Top: Motor Coast Guard vessel for Uruguay.

Right: The 1,400 hp. Fiat Diesel installed in the motorship "Lero."

Below: Diesel Tanker "Solarium" for the Anglo-Saxon Petroleum Co., also built at Trieste and powered by Fiat.



In 6 years Sabine Towi has Insta

MUNGER T. BALL
President & General Mgr.

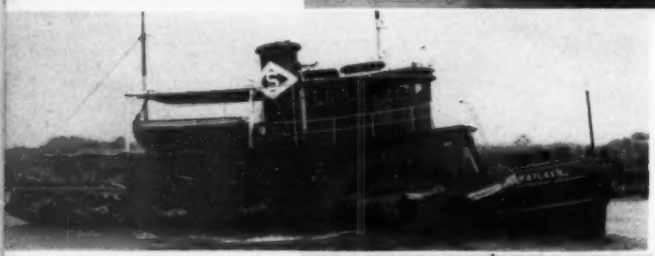
R. P. SMITH
Vice-Pres. & Treasurer

The tanker, "PUROL PEP," *140 x 29 x 10 feet, 380 gross tons, is powered by two 6-cylinder, 10" x 13" Atlas Imperial Diesels and a 7½" x 10½" Atlas Diesel auxiliary generating plant.*

The "LIEUTENANT," *42 x 10 x 4 feet, 9 gross tons, is powered by a 4-cylinder, 7½" x 10½" Atlas Imperial Diesel.*

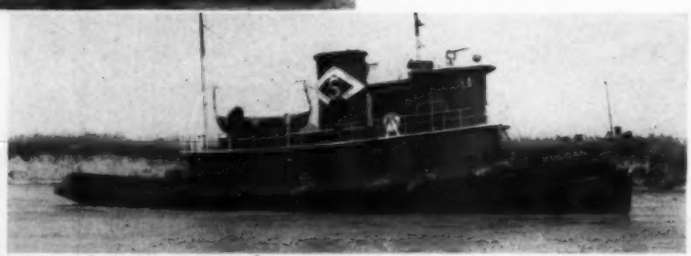
The "CAPTAIN," *50 x 12 x 5 feet, 15 gross tons, is powered by a 4-cylinder, 8½" x 12" Atlas Imperial Diesel.*

The new "ADMIRAL," *50 x 14 x 5' 2", 25 gross tons, is powered by a 6-cylinder, 9" x 12" Atlas Imperial Diesel.*



The "ATLAS," *67 x 18 x 9, 85 gross tons, is powered by a 6-cylinder, 11½" x 15" Atlas Imperial Diesel.*

The "VULCAN," *93 x 22 x 10, 141 gross tons, is powered by a 6-cylinder, 14½" x 18" Atlas Imperial Diesel and a 3-cylinder 6½" x 8½" Atlas Diesel auxiliary generating plant.*



The barge "PURE SHERRILL" *is a sister ship of the* "PURE WOFFORD." *Her dimensions are identical, and she also carries a 4-cylinder, 6½" x 8½" Atlas Diesel which powers the air compressor.*

THE Sabine Towing Company of Port Arthur, one of the largest and most successful towing concerns on the Gulf Coast, has installed nineteen Atlas Diesels in its various tugs, tankers and barges in the past six years. Its substantial growth since its organization is a tribute to astute business management and capable and careful employees.

The parent company was organized in 1908 by Munger T. Ball, as the Sabine Water Company. Its equipment consisted of one water barge and the tug "COMMODORE," then powered by a 50 H.P. gasoline engine. Business prospered and in 1915 the equipment of the company consisted of 5 tug boats powered by semi-Diesels and 20 barges. It was then incorporated as the Sabine Ice, Water and Towing Co.

Sensing the trend toward Diesel power, the Sabine management made a careful analysis of the Marine Diesels on the market, which investigation culminated in an inspection trip to the Pacific Coast by Munger T. Ball, President and General Manager, in 1929. He interviewed boat owners from San Pedro to San Francisco, ending his tour with an inspection of the Atlas factory in Oakland. He had seen many work boats in operation and had talked to their owners and skippers. He had satisfied himself as to the stability of the engine builder, and complimented Atlas with an order for five engines.

The choice of Atlas Diesels for the entire Sabine fleet, according to com-

ATLAS IMPERIAL DIES
OAKLAND, CALIFORNIA

ATLAS IM

wing Company stalled 19 Atlas Diesels

A. S. HANSEN
Vice-President

L. L. ABSHIRE
Vice-Pres. & Secretary

pany officials, was made because of "their simplicity of operation, relatively low upkeep cost, and economy of fuel and lubricating oils." Today, with nineteen Atlas Diesels in service, Sabine officials observe: "Our choice of Atlas Motors has been more than justified, and the satisfactory manner in which they have performed is evidenced by the number of repeat orders for more and bigger motors which we have installed."

In 1931, the ocean and coastwise business and equipment was incorporated as the Sabine Transportation Company, affiliated with the Sabine Towing Company, which handles the harbor and inland waterways business. The Sabine companies have performed all manner of tows, both inland and sea tows, ranging from disabled steamers to dredge boats. The principal activity of the company today is the towing of petroleum products, through the inland waterways and the Gulf of Mexico around to New York Harbor.

The concern which started out 30 years ago with one tug and one barge, owns a fleet of 9 tankers, 14 tugs, 10 coastwise barges and 18 harbor barges that are the envy of many a tug boat owner. It employs a personnel of more than 700 men, maintains its own repair plant including a machine shop, woodworking, tin, electrical and welding departments with thirty mechanics continuously employed in the maintenance of the Sabine fleet. Active management is in the hands of the four men shown above.

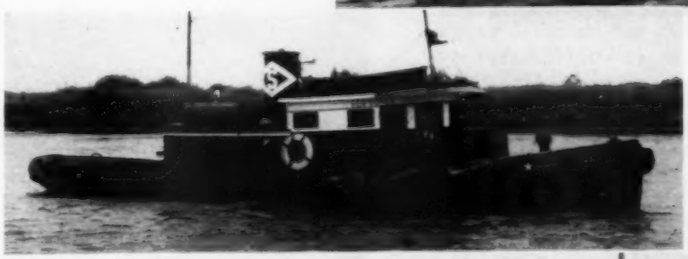
"BARGE 101," 175 x 40 x 11, 600 *gross tons, is powered by a 4-cylinder, 6½" x 8½" Atlas Imperial Diesel.*

"BARGE 106," 175 x 38 x 10 *feet, 545 gross tons, is powered by a 3-cylinder, 6½" x 8½" Atlas Imperial Diesel.*

The "HERCULES," 86 x 18 x 7 *feet, 57 gross tons, is powered by a 6-cylinder, 14½" x 18" Atlas Imperial Diesel.*

The "SAMSON," 67 x 18 x 9 *feet, 85 gross tons, is powered by a 6-cylinder, 11½" x 15" Atlas Imperial Diesel.*

The original "COMMODORE," *mother of all the Sabine boats, 44 x 10 x 5, 12 gross tons, now has her fourth power plant, a 4-cylinder, 7½" x 10½" Atlas Imperial Diesel.*



The "BOB GOREE," 50 x 10 x 6 *feet, 10 gross tons, is powered by a 4-cylinder, 8½" x 12", Atlas Imperial Diesel.*

The barge "PURE WOFFORD," 252 x 43 x 21 *feet, 1976 gross tons, utilizes a 4-cylinder, 6½" x 8½" Atlas Diesel to drive an air compressor supplying the cargo pumps, winches and steering gear.*

AL DIESEL ENGINE CO.
IA • MATTOON, ILLINOIS

MPERIAL

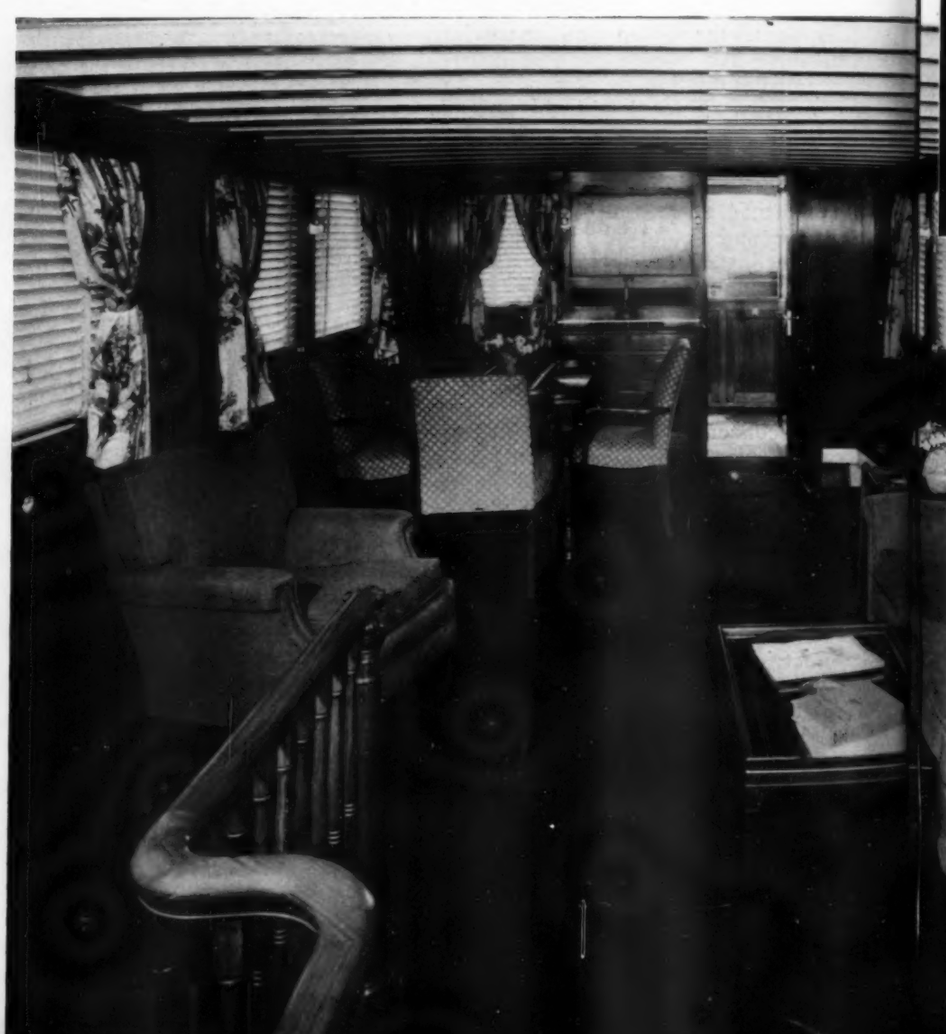
"WE THREE"—A 61′ DIESEL HOUSE BOAT

By JOHN W. ANDERSON

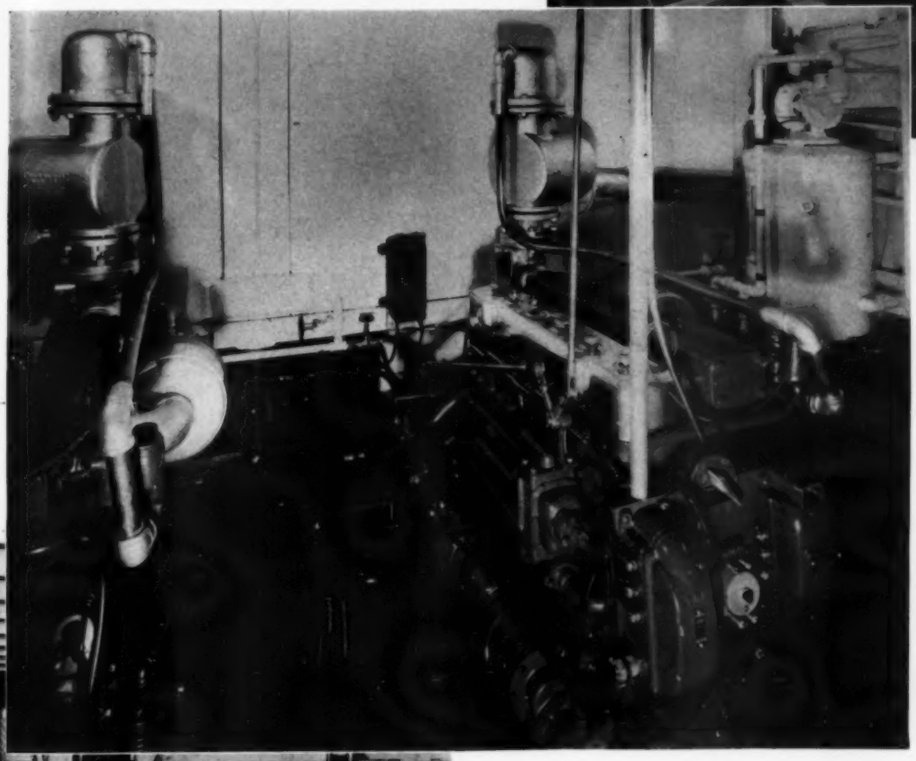
WE THREE is an attractive 61-foot Diesel powered house boat recently delivered by the Mathis yard at Camden to Dr. Leon Levy of Philadelphia. The hull is substantially built of white oak framing and long leaf yellow pine planking, with all outside trim of Mexican mahogany. As the photographs show, the model and type of hull is designed strictly along cruiser lines with plumb stem and deadrise transom stern combining maximum seaworthiness, rugged construction, speed, roominess and comfort below as well as on deck, not to be found in any other type.

The beam of 16½ feet gives plenty of stability, and the draft of 4 feet is sufficient for good performance offshore and is not excessive for inland waters. Of special interest are the large round cornered rectangular portlights for the quarters below deck. Each one of these ports gives as much light and air as three 9-inch regular round ports, and instead of hinging they slide horizontally in tracks in back of the panel work.

The interior arrangement places the crew of three in the forecastle, then come in turn the galley and engine room — all of them extending right across the boat. The after engine room bulkhead is insulated to protect the owner's quarters. First there are two double staterooms, then two bath rooms, one for the staterooms and one for the owner's stateroom aft, that extends across the boat. In the midst of



The commodious and comfortable after deck typifies this Mathis 61 foot houseboat. The engine room is splendidly laid out, with plenty of room around the engines and a very complete installation of auxiliary equipment.



all of these quarters there is the passageway for access to them and to the living and dining room on deck. This room is 10 feet wide by 20 feet long, and there is a generous open after deck space.

The pilot house is just forward of the living room and thus partly over the forward end of the engine room below. This makes it simple to arrange for pilot house control of the Diesel engines as is done.

The engine room is 8′ 2″ long and houses all of the machinery. The twin screw propelling engines are Buda Lanova model LDMR 468 Diesels rated at 110 bhp. each at 2,000 rpm. Built into the after end of each engine unit is a Joe's marine reverse clutch and a Morse Chain Co. reduction gear with a ratio of 2.55 to 1. Propellers are 28″ diameter by 26″ pitch. The boat makes a comfortable cruising speed of 13 mph. with the engines turning 1,600 rpm.

Two fuel tanks of 600 gallons total capacity give a cruising range of 900 miles or over.

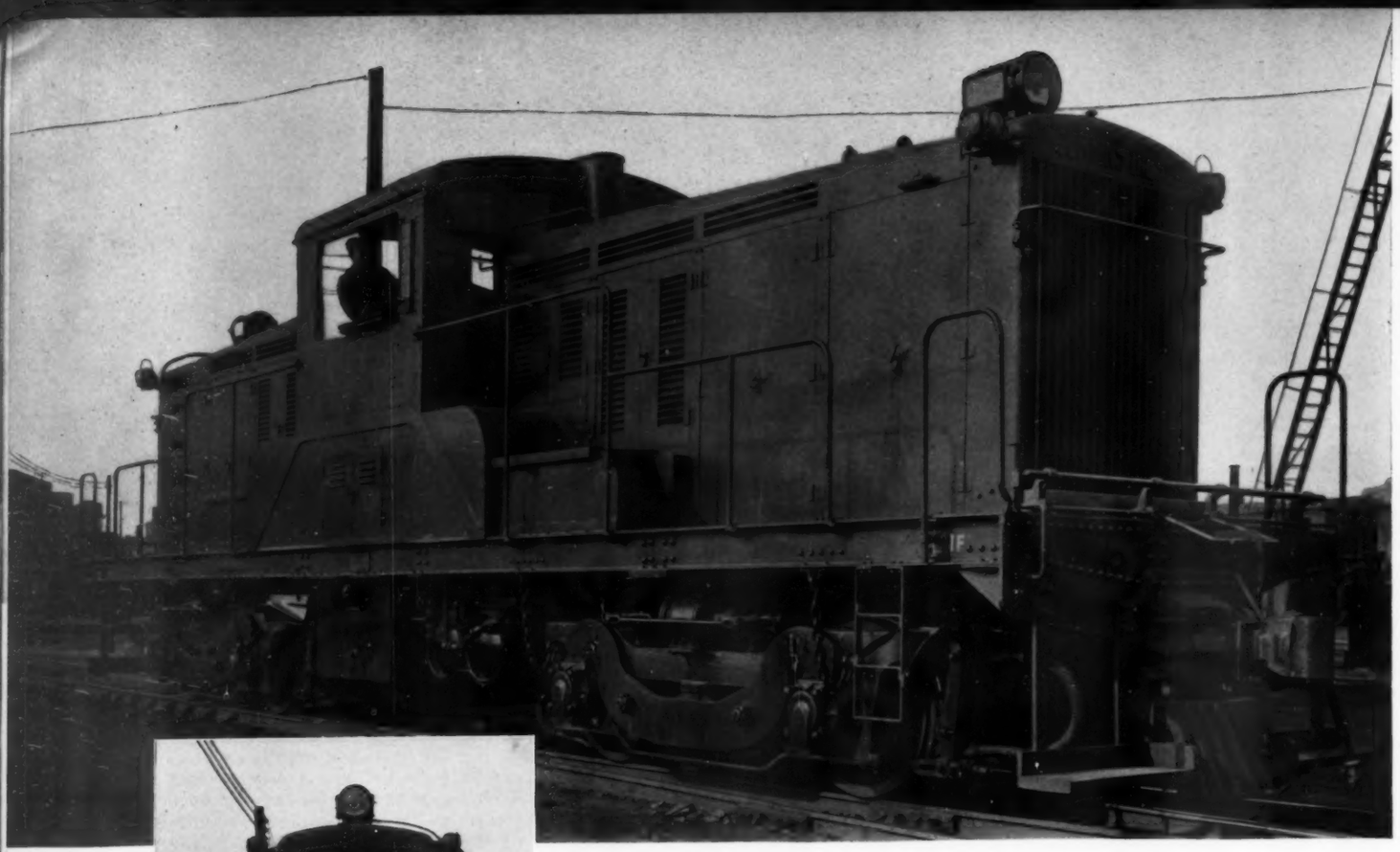
Diesel engines are equipped with Leece Neville electric starting equipment. Energy for starting, also for lights and miscellaneous power purposes about the boat is obtained from a 24-volt storage battery. For charging purposes there is a special generator driven by belt from the starboard propelling engine. Normally the battery is charged while the boat is underway, but by leaving the clutch to the propeller in neutral the engine can be run to charge the battery. Electrical equipment fitted is quite complete including switchboard and searchlight.

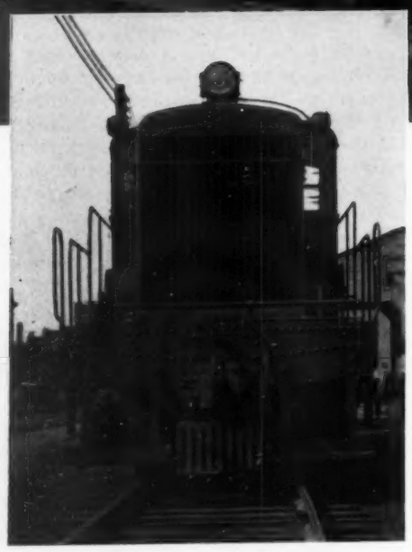
Additional engine equipment consists of a model T-R water washed type Maxim silencer on each engine, also a Harrison oil cooler and Nugent fuel oil filter.

Fresh water tanks of 580 gallons capacity are fitted, and running hot and cold water are piped to all fixtures and the shower baths in both the owner's and the crew's quarters. All quarters are heated with a hot water heating system with the heater itself located in the galley where it is convenient for attention by the crew.

The use of Diesel engines in houseboats has has not progressed as rapidly as in the case of express cruisers, fishing boats, etc., but this new, compact, very livable houseboat typifies what can now be done with available Diesel engines. The Mathis yard is famous for building houseboats – they are to be congratulated on *We Three* as offering a safe, comfortable, compact Diesel houseboat.

The simplicity of the machinery installation, the ease of its control, and the economy of operation are noteworthy. A fuel cost of around five cents per mile with complete absence of fire hazard is something to think about. Add to these the roominess and comfort that this boat provides, and you have the latest thing in house boats – the *We Three*.





CUMMINS 1000-HP DIESEL LOCOMOTIVE

By J. W. BRAUNS*

A STUDY made by the Fort Worth and Denver City Railroad showed the suitability and the economy of the Diesel-electric locomotive for performing its service. An order was therefore placed with the Cummins Engine Company for a 90-ton, 1,000-hp. Diesel-electric locomotive powered with two Cummins engines, each rated 500 hp. at 1,000 rpm. The locomotive is designed for switching, transfer, or mixed passenger and freight service, and is provided with traction motors having a maximum gear reduction for switching service, and armature construction good for locomotive speeds of 63 mph. for the mixed service requirements.

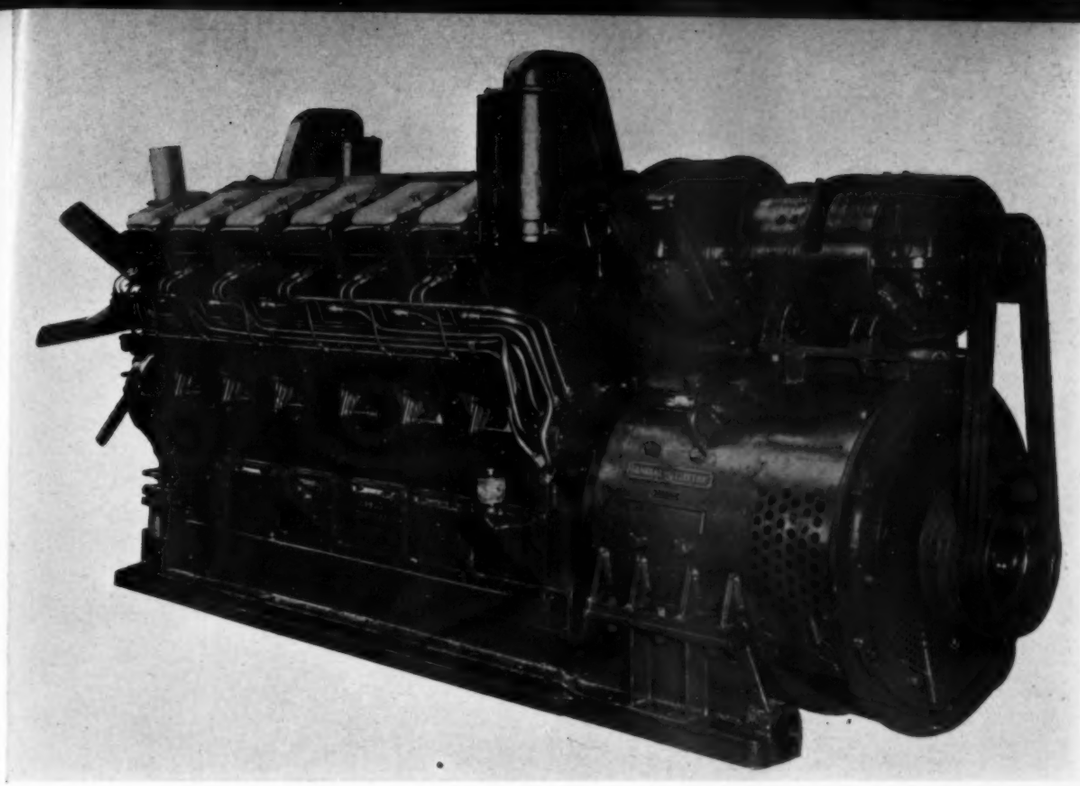
The dual power plant locomotive offers the advantage that, in case of an engine failure on the main line, the locomotive can come in on its own power, thereby practically insuring against locomotive failures resulting from engine troubles.

The cab assures maximum convenience and visibility for the engineer and helper. The air-brake handles are directly in front of the engineer, and the throttle and reverse handle at his side. The throttle arrangement at each operator's position is such that either engine throttle can be disconnected by lifting a spring return button. All meters and gauges are either directly in front of the engineer or slightly to his side with the front of the panel facing the operator to permit full visibility. There is a small control panel at each end of the cab, an electric heater at each operator's position, and a hand brake at one end of the cab. The cab walls are insulated with hair felt, and there are ventilators at each end above the center stationary windows.

A sectional type Young radiator with six-inch-deep removable cores and cast top and bottom tanks is located at each end of the hood. Air is pulled through the radiators by an eight-blade, 54-inch diameter, belt-driven fan mounted on each engine. Each radiator is protected by a winter-front operated by hand from the engineer's position in the cab.

The trucks are of integral cast-steel frames with double drop equalizers and semi-elliptic leaf

*Transportation Department, General Electric Company, Erie, Pa.



The twelve cylinder V-Type Cummins Diesel 7" bore, 10" stroke, 500 hp. at 1,000 rpm. Accessories shown include Donaldson air filter on air intake and Nugent lube oil filter in lower left corner.

springs. The equalizers consist of two steel bars reinforced for spring hanger pins. Melcher Fafnir 6½ x 12 journal boxes are provided. The 38-inch rolled-steel wheels are mounted on axles which are 8 inches in diameter at the motor fit. American Steel Foundry clasp brakes insure maximum braking effort on the wheels.

The two Cummins model VL-12 four-cycle Diesel engines with seven-inch bore and 10-inch stroke are each rated 500 hp. at 1,000 rpm. Each engine is equipped with bayonet gauge for testing the height of oil in the engine crankcase, and pressure gauges for each engine are located on panels at each engineer's position. Each engine can be started either electrically by the main generator from a 56-cell Exide storage battery, or by air from a two-stage Quincy air compressor driven by a gasoline engine.

Standard Cummins low-pressure geared fuel pumps withdraw the fuel from the fuel tank, pass it through the Nugent filter and deliver it to the single-plunger valveless distributor pump.

The distribution of the fuel is controlled by a distributor disk in which one hole has been drilled for each fuel supply line. As the disk revolves, the holes index under the opening of each fuel supply line in regular firing sequence and permit only an accurately metered amount of fuel to be delivered to the injector.

In the Cummins injector the fuel is held suspended in a thimble-like cup and exposed to the intense heat of the combustion chamber. At the moment when the fuel is injected into the combustion chamber the combination of preheating and pressure literally cracks the fuel into a rich gaseous mixture which assures progressive burning and a clear exhaust.

To provide a mechanical turbulence in the combustion chamber the piston is so shaped that the air is formed into a ball-like volume. In addition, a recess is machined in the head of the piston, into which a cap having a small hole in its center is screwed. The upward stroke of the piston compresses air into this chamber. On the downward stroke the released air rushes out into the combustion chamber, increases the turbulence and blows away any carbon deposit which might tend to accumulate on the end of the injector.

Each engine is provided with two Donaldson-type air cleaners and with Burgess mufflers in the exhaust pipe arrangement.

Each engine drives through a flexible steel-disk coupling one General Electric single-bearing, split-pole, differential-type generator. Belt-driven from a shaft extension of the generator is a 5 kw. auxiliary generator-exciter set and a 74 cu. ft. Quincy air compressor operating at 130 lb. pressure. A thermal relay is provided with each generator to compensate for any temperature change in the generator field, thus insuring that the generator characteristic properly follows the normal engine horsepower curve at full load. Full engine output is therefore available at normal operating speeds of 7,000 rpm. and over a wide range of locomotive speeds.

Each generator delivers its output to two General Electric type GE-716 railway-type heavy-duty 415 hp. traction motors with single reduction gearing. This motor has box-type frame and is equipped with constant-oil-level axle bearings and anti-friction armature bearings. Each motor is provided with a fan, but is separately ventilated from a blower on the shaft extension of the auxiliary generator-exciter set. The motors are mounted with a double-noze spring suspension.

General Electric double-end electro-pneumatic control provides for two motor combinations, with provision for field shunting. In the first combination two motors are connected in series across each generator, and in the second two motors are connected in parallel across each generator. The transfer from one motor combination to the next and to field shunting is automatic, thus insuring maximum power without abuse to the electrical equipment.

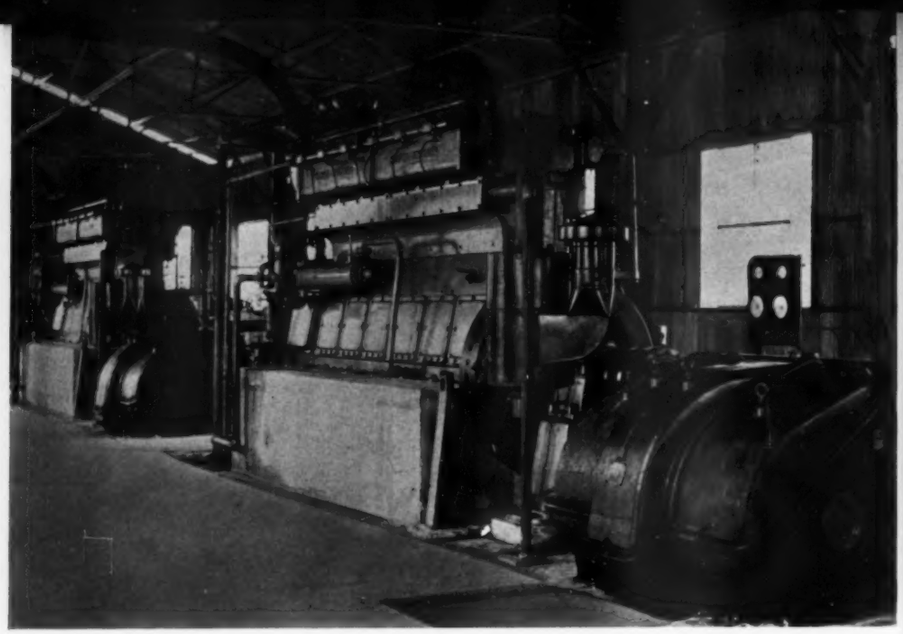
A master controller, used essentially to throw the motor reverser, consists of a small drum with three fingers mounted in the box with a removable cover. Operated by a small handle located directly below the engine throttle handle, it provides "Forward," "Reverse" and "Off" positions. The operating shaft is mechanically interlocked with the engine throttle control mechanism.

Two group-control switches, one having 13 and the other five buttons, are located at each operator's position. All operations of the locomotive can be controlled from the push buttons of these control switches.

This locomotive has been delivered to the Chicago, Burlington and Quincy Railroad for demonstration purposes before being shipped to the Fort Worth & Denver City Railroad in Texas.

DIESEL PIPE LINE PUMPING STATION

By ORVILLE ADAMS



Close up veiw of the two Cooper-Bessemer Diesels driving oil pipe line pumps south of Tampico, Mexico.

ABOUT fifty miles east of the coast, south of Tampico, Mexico, in practically a tropical jungle is the Poza Rica oil field, an English concession extensively developed by the Compañia Mexicaná Petroleò, "Aquila SA," a Royal Dutch Shell subsidiary, manned by as resourceful a staff of English engineers as to be found in the remote regions of the world. From the Tuxpan Bar, at the confluence of the Tuxpan river, one travels south about 50 kilometers into the interior to the Poza Rica field by narrow gauge railroad over which men and all materials must be transported.

The difficulties encountered in the development of an oil field in this region simply cannot be appreciated by one not familiar with the tropical climate and conditions of the country immediately adjacent to the coast south of Tampico. Here, the natives who recognize only gold as money, shy of the white man and live in inaccessible jungles, resist the invasion of the intruder, and how they live in their native habitat is still practically unknown, for they resist any effort of the white man to penetrate in the direction of their villages or to spy into their mode of life. They do, however, come out of their jungle fastness to work for the foreign concerns developing this territory.

In this setting English engineers of the resourceful and adventurous sort have been able to tap one of the most productive fields in Mexico. They employ, for the most part, only native labor, and all work, except for supervision and engineering is required to be done by Mexicans as a National policy.

For sometime, steam engines of American manufacture were used exclusively for pipe line and pumping power in these fields. However, steam operation under such conditions has been extremely difficult and discouraging, and it is not surprising to find some of the finest Diesel engines in the pipe line pumping stations located far in the interior of this region, all of this machinery having been transported over the small and inadequate narrow gauge railroad that must be built around hills and mountains and across dangerous ravines under great difficulties.

In the Poza Rica field, about 50 kilometers from Tuxpan Bar this company built a station last summer, July, 1936, and a duplicate station is being built this summer near the coast. The station shown in the photographs and built last year has been in operation for some months. Here there are three engines and the same number is used in the station now being projected.

The engines are shown in the illustrations. Six Cooper-Bessemer type JTD-6, with cylinder sizes 11½ x 15 were purchased. These engines are rated from 260 to 315 hp. within a speed range of 272 to 328 rpm. The power cylinders are removable liners, cast of nickel iron and internally ground to smooth finish. On account of the service requirements which sometimes call for increased power, the capacity can be increased by speeding up the engines.

The heads and valve gear parts may be removed and replaced without disturbing the fuel injection valve timing and other adjustments. The fuel injection valve nozzles are readily removable and the fuel tips easily changed. Exhaust valves, in water cooled cages are made of alloy forged steel having high heat resisting qualities.

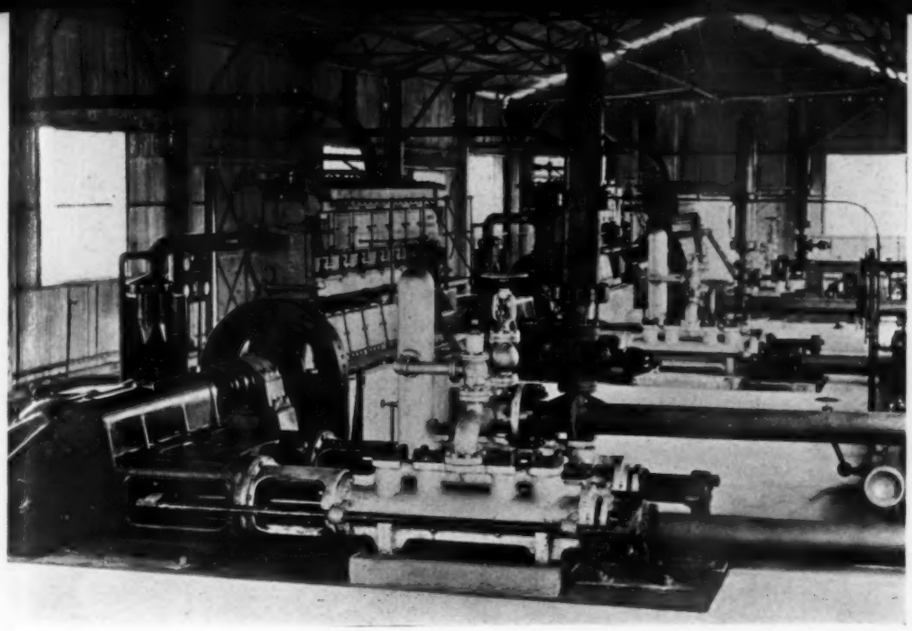
The engines are direct connected to Wilson-Snyder Duplex heavy duty roller bearing piston pumps. Pumps of this type were the first to use roller bearings instead of the regular Babbitted bearings, the purpose of the roller bearing being to improve the reliability of the built-in gear reduction by carrying the thrust load with safety against all conditions. The pumps are 6½ x 18 and have a capacity of 438 gallons per minute at 48 rpm., or 15,000 gallons per day at this speed and 18,000 gallons per day at 58 rpm. against a pressure of 800 lbs. per square inch.

The engines are cooled by circulating the oil from the pipe line through a shell and tube cooler through which water is circulated after leaving the engines by means of a built-in centrifugal water cooling pump having a capacity of 150 gallons per minute. This extra large cooling capacity is made necessary on account of the tropical conditions and the use of oil that comes out of the ground with as much as 100 degrees temperature and may gain temperature in the gathering tanks. Using 100-degree oil in such a climate as this places a heavy burden on any cooling system, for the difference in temperature between the inlet and outlet, or the heat extracted per gallon of water circulated, must of necessity be small, hence calling for the circulation of considerable water through the shell and tube cooler.

The engines are equipped each with a Vortox air cleaner. This type of cleaner is desirable because it gives maximum efficiency under the operating conditions and requires very little attention except at intervals, and since native operators cannot be expected to attend to numerous details, the engines are well protected by every kind of device that improves the operation.

Maxim mufflers are used on each engine to handle the exhaust silencing, and these silencers likewise entail a minimum of attention, and give good results. Each station has duplicate starting units, consisting of engine and compressor and starting tanks. The starting units are Cooper-Bessemer type GX2A engine driven types with two engine cylinders and two compressor cylinders.

Since it is absolutely necessary to have a continuous check on the continuity of operation



General interior view of the station with the Diesels in the background.

grass huts to which they have always been accustomed.

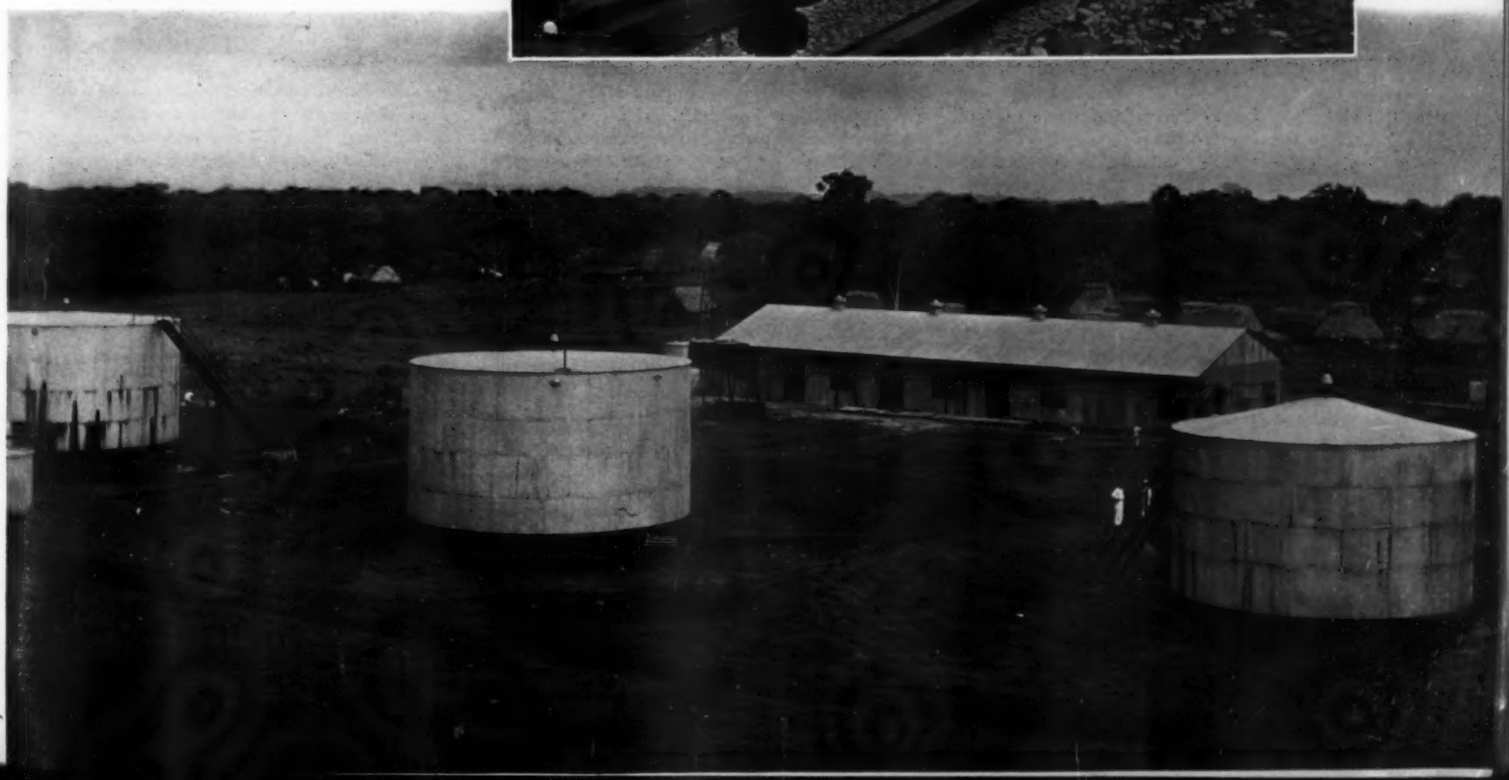
While oil lights are used extensively for night work in these remote parts, these plants have small electric generators for furnishing current for lights.

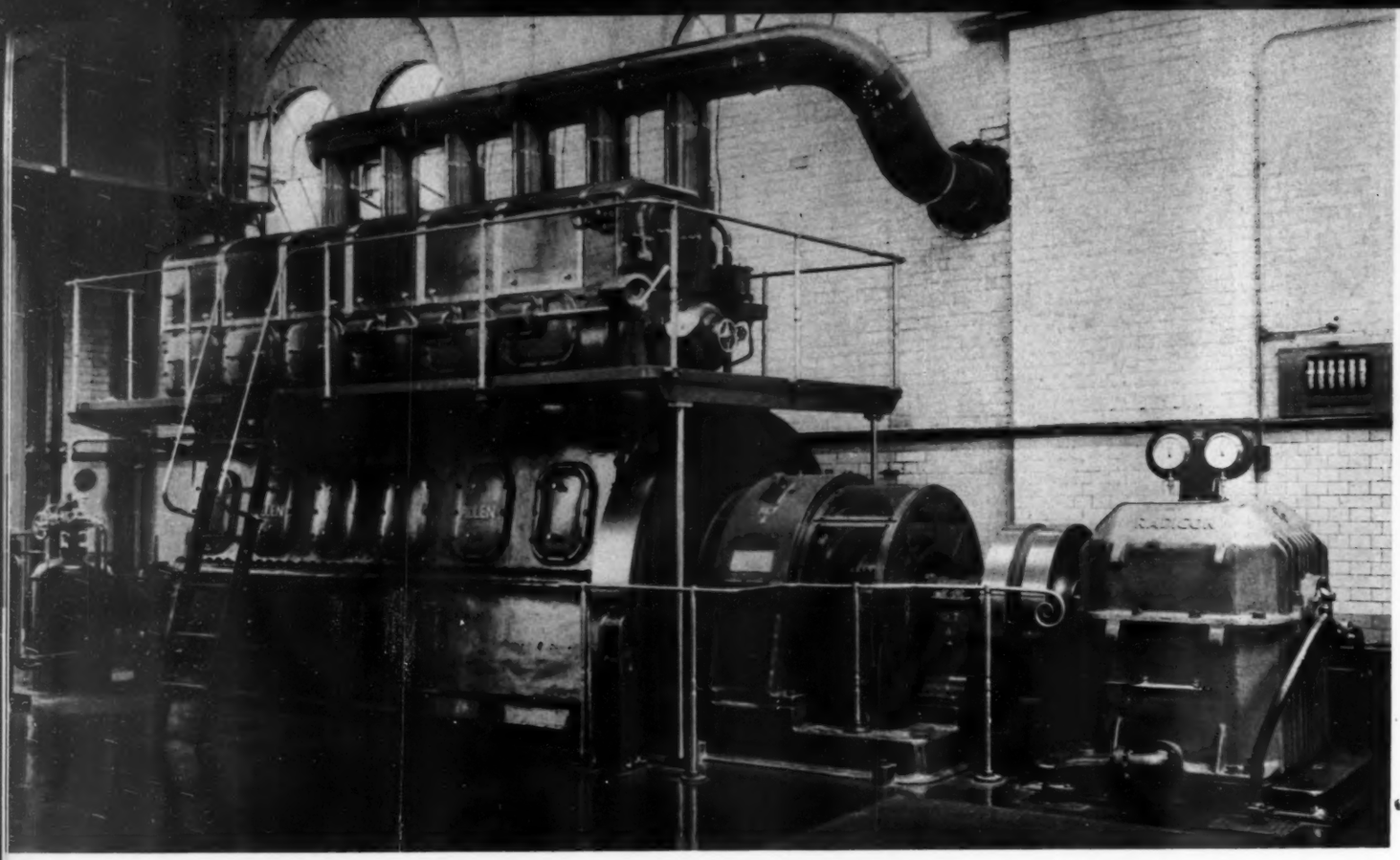
Constant production in this field requires that the station operate without loss of time. In case of a unit being down for repairs, the remaining units are required to operate at increased speeds and capacities to move the oil, since there is no standby capacity available, and without this extra peak capacity through increased speeds, excess production would become an immediate problem unless the station was able to handle it. The reliability and dependability of the Diesel engine in a country like this is paramount, especially in this particular service under the operating conditions mentioned.

as well as data on the performance of the engines, recording instruments or gauges are used to keep a continuous record on circular charts for the cooling water, fuel oil pressure and the speed of the engines. A recording gauge of the Bristol type is used for these cooling water temperature indicators, fuel oil pressure gauges and the tachometer. Exhaust temperatures are likewise recorded by a Brown Pyrometer with thermocouples for each engine cylinder.

As shown in the photograph of the station building, the regulation steel building, on concrete mat, houses the engines and pumps. As we see around the station, there are no familiar buildings for housing the workers, since the natives prefer to build and live in their own

Exterior piping connections for parallel discharge. Below — Grass huts of the native workmen are visible behind the pumping station.





Typical six cylinder Allen Diesel engine operating in one of the stations of the East Surrey Water Company.

LONDON LETTER NO. 23

By G. R. HUTCHINSON*

SINCE the last London Letter was written I have spent a most interesting and busy time viewing various new installations. In view of this it is really difficult to know where to begin, for several of the plants are of especial interest. One of the most interesting of these, to my mind, is the standby equipment at the British Broadcasting Corporation's Empire Transmitter Station at Daventry, which is situated a few miles south of Birmingham. As many readers of DIESEL PROGRESS may be aware, the British Broadcasting Corporation has employed Diesel power in a number of its stations, several of these installations being model examples of what a Diesel power station should be like. At Daventry, however, Grid supply is used, doubtless as a matter of policy, in view of the governmental character of our broadcasting organization, but for standby purposes Diesel power has been chosen. In view of the disturbing experiences which we have had in recent years with the Grid system, which has not proved the acme of reliability, this precaution is a wise one. The power-house at Daventry is a plain but dignified brick building with a silencer annex at the end. This building, which is illustrated, houses a couple of English electric six-cylinder, four-stroke cycle, airless-injection engines, which are directly coupled to English electric alternators and DC exciters. Each engine develops 750 bhp. at 375 rpm. and drives a 500 kw. alternator. The flywheels are particularly heavy because of the exceptional requirements of the plant in question in respect of cyclic irregularity. In general design the engines, which are illustrated, follow standard English electric practice and are provided with Burgess intake silencers, a water-cooled exhaust manifold, and inbuilt oil cooler and forced lubrication pumps. Cooling is on a circulating system with separate motor-driven pumps and an external cooler, while the station equipment includes a centrifuge for the fuel oil but no form of fine filter or centrifugal purifier for the lubricating oil. The engines are remarkably easy starters, as was demonstrated to us, and are commendably free from vibration at the operating speed.

I believe I have already made reference to the up-to-date policy of our Metropolitan Water Board in their program of pumping station modernization and extension. In this work the use of Diesels plays a large part and the satisfactory operation of these engines already installed in recent years certainly indicates that the engineering staff of the Metropolitan Water

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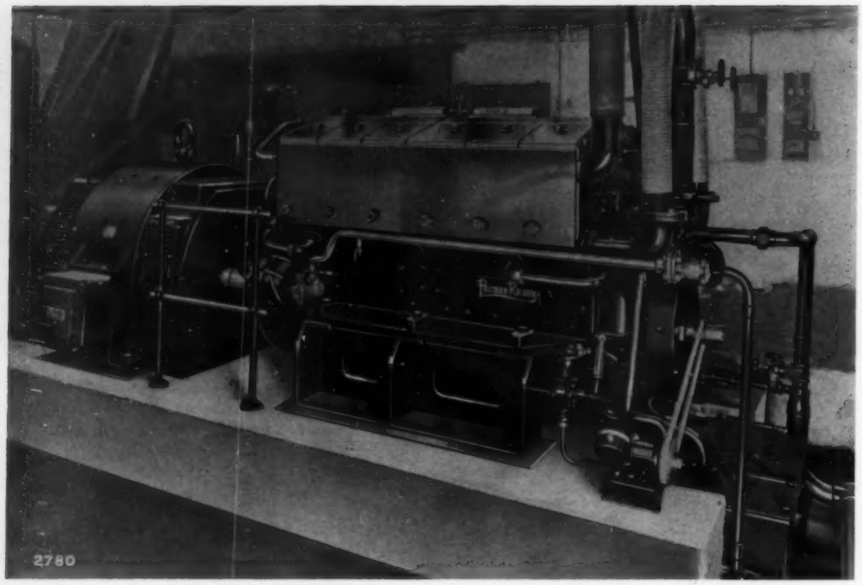
Board have pursued a sound policy in extending their Diesel plant. The latest Metropolitan Water Board pumping station which we have had the opportunity of looking over is the re-engined Hornsey pumping station, where their beam-engined, steam-driven, pumping sets have been removed and replaced by modern Allen oil engines and Allen centrifugal pumps. The station is a comparatively small one from the Diesel aspect, for it contains only two oil engines, both of which are six-cylinder units of 295 bhp. at 275 rpm. The overload capacity is 325 bhp. at 303 rpm. An interesting feature of the plant is the utilization of a multi-strand rubber belt drive between engine and pumps. In this way a pump speed of 1,000 rpm. is conveniently and cheaply obtained, the 18-strand rubber belts having a ball bearing jockey pulley to ensure maintenance of tension. Each engine drives two Allen centrifugal pumps arranged in tandem, the output in series being 3,000,000 gallons per 24 hours against a head of 300 ft., or 6,000,000 gallons per day, when working in parallel against a head of 150 ft. The engines are normal Allen six-cylinder units with open combustion chambers and C.A.V.-Bosch injection equipment. Stream-Line filters are provided for the lubricating oil, while cooling is on a closed circuit with multitubular coolers. Compressed air for starting is provided by a small single-crank compressor which is driven by a Lister high-speed oil engine of 7 bhp.

Exterior view of the British Broadcasting Company's Station at the Daventry, England, where two English electric 750-hp. Diesels are installed for standby service.

Although Germany has already produced a Diesel-engined car of small cylinder capacity and relatively moderate first cost, until a few weeks ago no such vehicle figured in the lists of a British manufacturer. It is interesting to be able to record, therefore, that Citroen Cars Ltd. of Slough, have announced a Diesel-engined seven-seater family saloon car for 1938. This vehicle is listed at £375, or £90 more than the corresponding petrol-engined vehicle. The car is essentially a utility family vehicle, and as the engine is only of 1,767 cc. cylinder capacity it has no pretensions to high performance. This four-cylinder engine, which has Bosch injection equipment and a Ricardo-Comet combustion chamber, is capable of developing 40 bhp. at 3,500 rpm. and is said to give a fuel consumption of about 45 miles to the gallon at normal touring speeds. The engine is rubber and spring-mounted in the chassis and forms a unit with a dry-plate clutch and three-speed and reverse gearbox. The Citroen people are to be congratulated upon their enterprise and it will be interesting to see if the vehicle meets with any considerable public appeal.

From a Diesel standpoint the most important item of immediate technical interest so far as Great Britain is concerned is the biennial Engineering & Marine Exhibition which opens at Olympia, London, W., on September 16, and

Close-up of one of two English electric Diesels which have been installed at the British Broadcasting Company in the building illustrated at the top of the page. The extra heavy flywheel discussed in the text may be noted at the right.



Paxman "V" Type 12 cylinder Diesel generating set now operating in the Army and Navy Stores, London, S.W.

runs until October 2. As in previous years, Diesel engines will form an important part of the Exhibition.

The power range will be from the small single-cylinder engines shown by National, Russell Newbery, Fowler, and others, not forgetting the very interesting Victor horizontal twin, to the large direct-reversing engines of Ruston & Hornsby, Allen, and others. Several new engines are announced but these are mostly latest examples of existing well-tried types, often with certain improvements and modifications. To my mind, one of the most interesting of the really new engines is the Petter blower scavenging marine engine which is illustrated. This is a 300 B.H.P. unit at 500 rpm. and has six cylinders. It follows the successful design which the Yeovil firm introduced some time ago primarily for industrial purposes but is of a larger size than we can recall having hitherto seen. The engine incorporates Zoller sliding-vane type scavenging blowers, which are directly driven off the engine, and oil-cooled pistons are used.

The essential pumps, including bilge pump and starting air compressor, are accessibly placed at the forward end of the engine and are driven from the crankshaft at reduced speed. Reversing is by means of the handwheel shown and follows new Petter designs of considerable ingenuity. Very rapid reversing is claimed but unfortunately space does not allow of our going more fully into this new reverse gear. Compactness and rigidity appear to be good features of the new engine, which should prove very suitable for coaster and tugboat service.

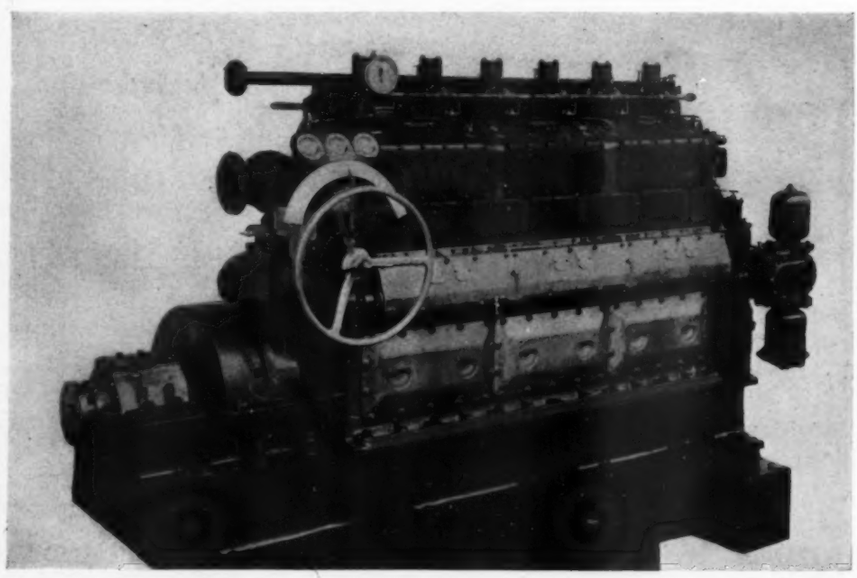
Examples of the new Petter harmonic induction engine will also be on view at Olympia, this engine, it will be recalled, having excellent scavenging characteristics for a comparatively wide speed range without the utilisation of any form of scavenging pump or blower.

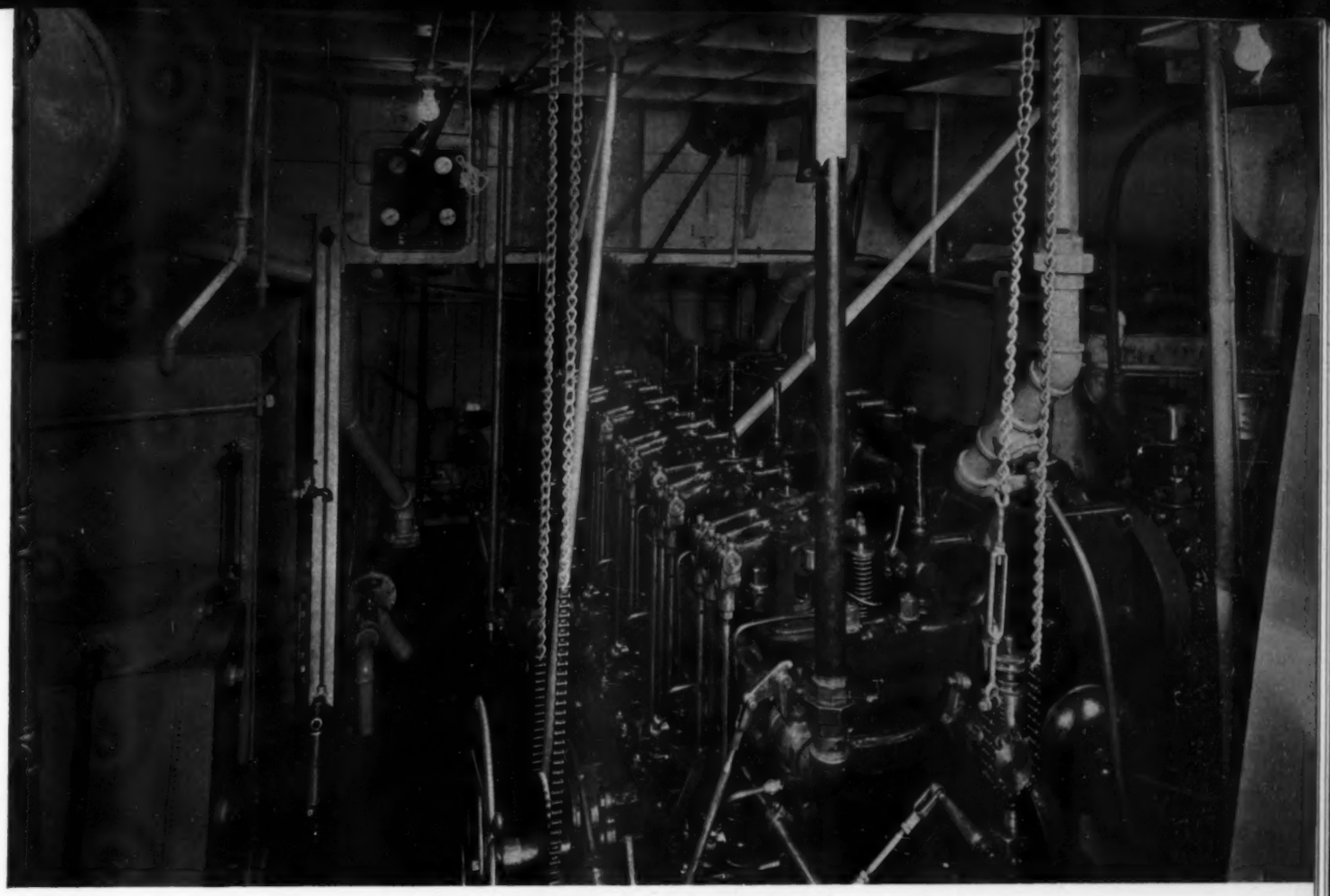
Previous notes have probably given the impression that I look with favor upon the horizontal oil engine. The satisfactory service given by hundreds of prime movers of this type in all parts of the world certainly indicate that this confidence, which is shared by many engineers and power users, is well placed. The horizontal engine of medium crankshaft speed still has a great deal to recommend it, notwithstanding the incursions which the modern high-speed vertical engine has made upon its province. We were reminded of this during a recent visit to a laundry at Chingford, in the E. 4 area of London. Here the proprietors of the laundry have wisely gone over from bulk supply to their own oil-engine-generated current, and have chosen a modern example of the well-known Blackstone horizontal engine.

The engine is of 65 bhp. at 230 rpm. and drives a generator through an 11-strand "Vee" rope, the speed of the generator being 1,500 rpm. This set is located in a very small engine house and provides current for several motors which drive hydro-extractors, washers, rolling machines, rams, etc. The economy achieved is noteworthy. With the engine operating 13 hours a day for 5 days a week and running 5 hours on Saturdays, the cost of fuel and lubricating oil is only 9s. for a full day, whereas the cost of electricity as previously employed, which presumably was obtained at the most favorable rates in the district, was no less than 26s. a day.

Turning briefly to the subject of agriculture, the petrol-engined Fordson tractor is a universally popular utility vehicle which many Diesel enthusiasts must have frequently regarded as an excellent subject for Dieselization. So far as Britain is concerned, several manufacturers have undertaken experimental work along this line but to date only one company seems to have brought such experiments to a successful conclusion. The Peterborough firm of F. Perkins, Ltd., have now made such a conversion and are showing the Perkins-engined Fordson. The engine chosen is the Perkins "Leopard," a four cylinder unit rated at 40 B.H.P. at 1,500 rpm. The tractor is neat, the injection gear is accessible, and the improved economy should attract enterprising Fordson users.

300 hp. Petter blower scavenging marine Diesel with new direct reversing gear.





Engine room of "Little Flower"— 200 hp. Enterprise Diesel

SEVEN MORE "GIANT TYPE" SEINERS

By CHAS. F. A. MANN

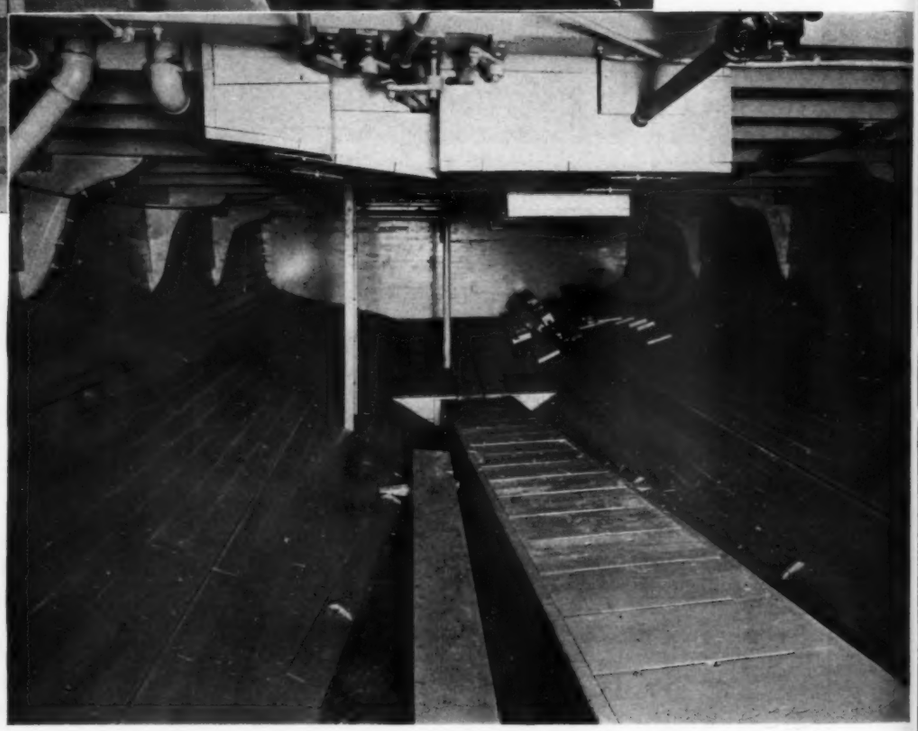
LATEST addition to the Western fishing fleet is the rather large fleet of Seiners just finished by the Martinolich Shipbuilding Corp. at Tacoma for a widely scattered ownership ranging from Vashon Island, Puget Sound, to Los Angeles (Terminal Island).

As the writer has mentioned previously, the Western fishing industry and the heavy duty, medium powered Diesel engine, grew up together, and one would not be where it is today, were it not for the other. Annually, after the first of January, plans are rushed in the busy shipyards of Puget Sound for the so-called "Spring Work," or whole fleets of finished vessels, ready for work before the first or middle of August. With designs for the Purse Seiners getting progressively better and more carefully detailed as the years pass, each builder tries hard to keep his pet plans in the forefront. Another one-tenth of a knot speed with the same power will definitely establish a hull design as the season's biggest success, and as quick as the wires hum, news of the improvement travels up and down the coast and is mess-table conversation in 3,000 fishing vessels before even the builder has signed the last clause in the purchase contract and turned over the new vessels to its owners!

Leading the parade of "Lucky Boats"— the kind that your superstitious and uncanny Western fishermen will swear by and order duplicates of the following year — are the boats turned out by the Martinolichs — father and three sons — with "Hull 223" having been delivered in August of this year. A record of 223 staunch wooden hulls in the lifetime of a single shipbuilder, some of them 400-foot wartime freighters, is a splendid thing to look back on. The latter day Martinolich operations in their new Tacoma yard call for almost exclusive concentration on a design from 70 to 85 feet in length, with a capacity of 120-150 tons of fish, and, of course 100 per cent Diesel powered. The seven new Martinolich boats may be described as one, as far as general design and equipment go, only the size of hull and engine varying with individual orders. The newest fleet of $38,000.00 boats follows:

Typical Galley on this new group of Purse Seiners.

Below — Fish hold will carry 140 tons of fish — 39' x 19' 10" with 9' 6" maximum height.



1. *New Example* — 78 x 21 x 10 ft. 4½ in., for the VanCamp Seafood Company of Terminal Island, Cal. She is powered with a 200 hp. six-Cylinder Enterprise Diesel engine.

2. *Pacific Fisher*— 80 x 21 x 10 ft., powered with a 260 hp. Atlas Diesel, and owned by the Coastwise Fisheries, Inc., of Seattle.

3. *J. B. Edwards,* owned by the Edwards Bros. of Vashon Island, Wash., 77 x 20 x 10 ft., powered with a 200 hp. Enterprise Diesel.

4. *El Padre,* owned by James Davi of Monterey, Cal., 82 x 21 x 11 ft. and powered with a 260 hp. six-cylinder Enterprise Diesel.

5. *American Rose,* owned by Joe Rappa of Monterey, Cal., 78 x 21 x 10 ft. powered with a 200 hp. Enterprise Diesel.

6. *El Capitan,* owned by Frank Spadaro of Monterey, Cal., 82 x 21 x 10½ ft., powered by a 260 hp. Enterprise Diesel.

7. *Little Flower,* owned by Tom Costanza of Monterey, Cal., 78 x 21 x 10½ ft., powered by a 200 hp. Enterprise Diesel.

Adhering to the same basic layout and general type of heavy Douglas Fir construction, one description will suffice for each of the above 7 boats. Keels are all one piece of magnificent old growth fir, such as found in no other part of the world, 12 x 14 inches by 60 to 75 feet long — some stick! Hull framing is double 12½ inch pieces, 6-8 inches thick, with hull planking 2¼ inches thick throughout. Deck beams are 6 x 12 inches and deck planking 2½ inches. Fixed ballast aft, in the fish hold, which serves to both steady the hull when running light and effecting a permanent seal around the keel and propeller shafting,

"American Rose" of Monterey

consists of ready mix concrete poured directly from the fitting out dock into the hold. From 9½ to 11 tons are poured into each ship.

Exceptional lines this year has raised the average speed on the 200 hp. boats from 11.4-11.6 knots to over 12 knots.

Deck winches, power rolls on the net turntable, anchor hoist, etc., are all driven off a lineshaft carried underneath the deck beams and clutch and chain driven off the main propulsion motor. More than 2,000 feet of net is carried on the turntable, 24 fathoms deep (144 feet wide to landlubbers). The power rollers are of the new open type with ironbark sheathing. Sixty fathoms of ¾ inch chain for hoisting the anchor and 65 fathoms of ¾ inch cable for pulling the seine line are handled from winches fore and aft on the main deck. The larger vessels will carry 135 tons of fish in the huge fish hold aft, which occupies almost half the entire hull. All these vessels can fish for herring, sardines or salmon, but most of them will fish sardines this year.

The engine rooms are marvels of compactness, with 3 bbl. lube oil tank storage, a Duro fresh water system and another exactly like it for handling the salt water sanitary system, a Fairbanks Morse salt water fire-bilge-fish and general service pump, a 3 hp. Witte Diesel auxiliary generator and a 300 ampere-hour 32 volt Edison storage battery set are all fitted round the engine room. In addition is the 1½ kw. generator belt driven off the main engine flywheel and 1½ kw. auxiliary generator driven off the 3 hp. auxiliary and a workbench and duplicate engine controls.

Pilot house control of engine and line shaft is arranged. Crew's quarters for eleven are fitted on the main deck. Some variations of the design have an open-top pilot house, with controls and steering wheel in complete duplicate, for maneuvering when spotting schools of fish. The galleys aboard these vessels are of white enamel, Philippine mahogany cabinet work, porcelain and tile sinks, light on three sides, large Lang oil burning galley range and hot water system, and in general as modernly equipped as kitchens in our leading hotels. Inlaid linoleum covers floors, seats and table tops, all of the same pattern. Quite an idea at that.

Shell underwater Graphite Grease is used in the shaft bearings instead of the old fashioned tallow, and is reported as giving excellent results.

Representing an investment of nearly $400,000 this latest addition to the pacific fishing fleet is easily the best group of fishing vessels built in the U.S.A. during the 1937 season.

Seiner "J. B. Edwards"—77 footer

TRANSATLANTIC AIRMAIL NOTES

By PAUL H. WILKINSON

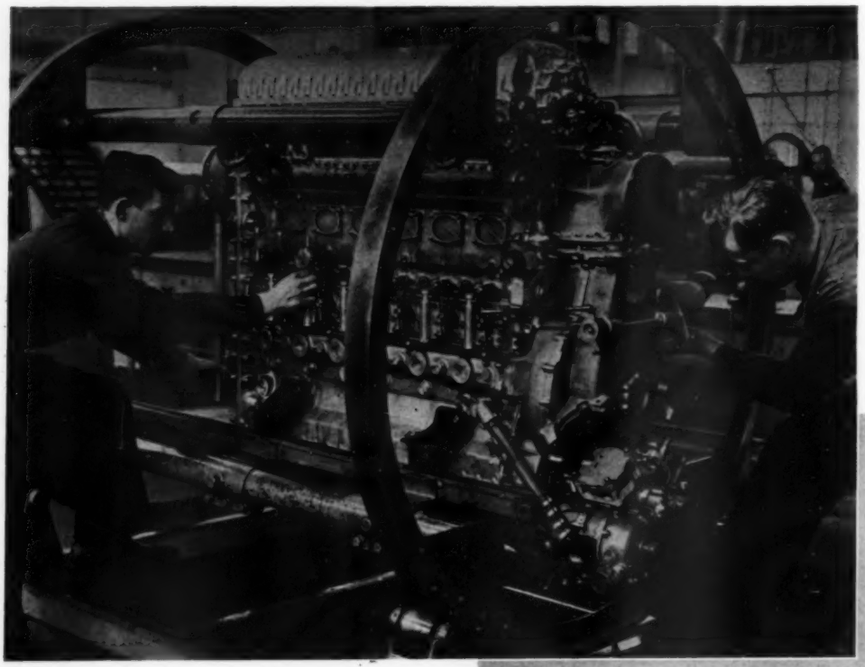
DESPITE optimistic forecasts, it is now generally conceded that transatlantic airmail service will not be in operation until 1938 — which means that passenger service probably will not materialize until 1939. Neither the United States nor Great Britain has yet completed sufficient survey flights and while Germany mapped out its route last year, it is only now completing its test flights with the actual equipment it intends to use.

The line-up for the forthcoming transatlantic air service is extremely interesting. Already several of the world's leading airlines have shown themselves most anxious to share in the lucrative aerial transportation business between the Old World and the New. Representing the United States is Pan American Airways, with its vast experience in the operation of aircraft to South America and the Orient. Imperial Airways, Great Britain's representative, has as its background its far-flung airlines to Australia and South Africa. The national airlines of Germany and France — Deutsche Lufthansa and Air France, respectively — have both had considerable experience in operating long-distance air services to South America. All of these airlines, on a merit basis, are logical contenders for the transatlantic air service.

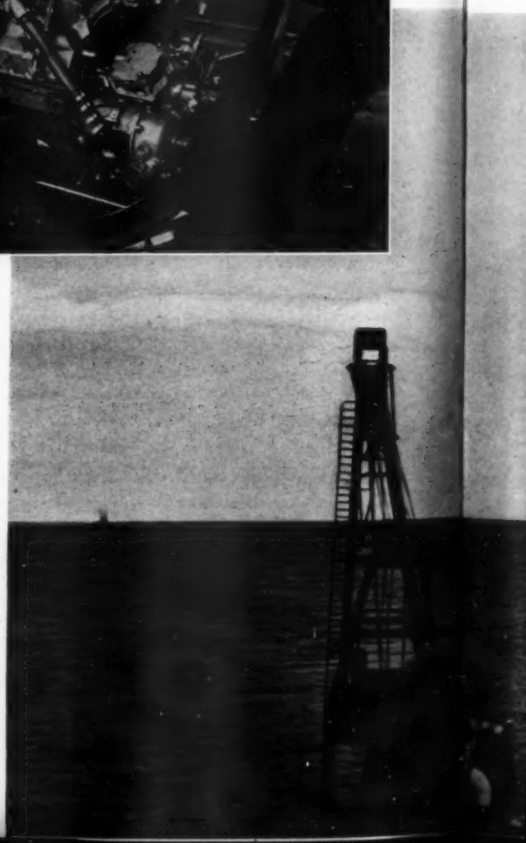
With regard to the routes which they will follow, Pan American Airways and Imperial Airways have certain advantages over their competitors. By reciprocal agreement, they have the exclusive use of excellent landing areas both along the northern route to Great Britain via Newfoundland and Ireland, and along the southern route via Bermuda and the Azores. This means that their over-water flights are shorter. Deutsche Lufthansa, because of this monopoly, had no alternative but to take the central or direct route to Europe via the Azores and Lisbon. Air France, by granting Deutsche Lufthansa landing facilities at Dakar, on the west coast of Africa, for the latter's South American service, will be entitled to use the German airline's floating bases and catapult ships at the Azores and New York.

The equipment which these four airlines will use varies considerably, particularly as to the engines employed. While Pan American Airways and Imperial Airways will depend upon four-engined flying boats powered with air-cooled gasoline engines of approximately 1,000 hp. each, Air France proposes to use six-engined flying boats equipped with liquid-cooled gasoline engines of 900 hp. The equipment of Deutsche Lufthansa, on the other hand, comprises four-engined twin-float seaplanes, powered with liquid-cooled Diesel engines of 600 hp., designed specially for mail and express service. To the latter's aerial fleet will be added for passenger service in due course, four-engined or eight-engined flying boats with 1,000 hp. Diesels.

Whereas the American, British and French airlines will rely upon "general purpose" flying boats with gasoline engines for combined passenger and mail service, the German airline regards airmail service and passenger service as two distinct functions. Furthermore, while the other countries are putting their faith in the gasoline engine, Deutsche Lufthansa will use the Junkers Diesel on its planes — which is a sure indication of the reliability with which



Final assembly of a Junkers "Jumo" 205 Diesel — the engine used by Deutsche Lufthansa on its new transatlantic mail-planes.



this ultra-modern power plant is regarded in its own country.

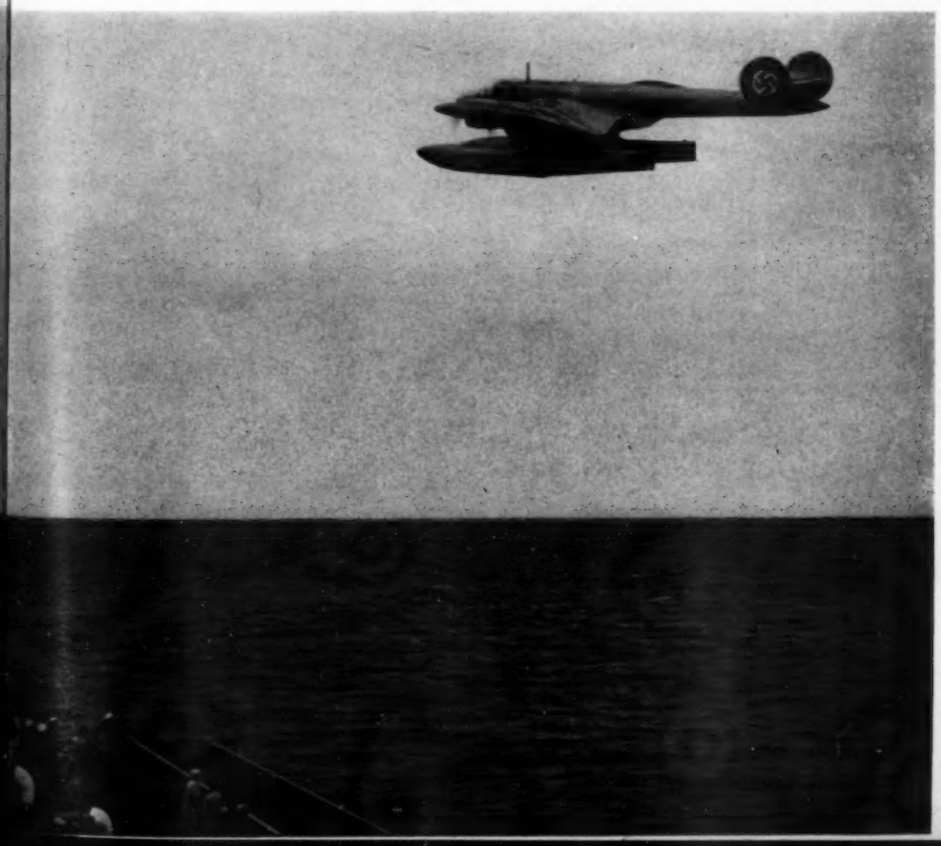
That the Diesel is destined to play an extremely important role in the development of international airlines is presaged by the marvelous results recently obtained by Deutsche Lufthansa with its four-engined seaplanes. Two of these craft – the *Nordmeer* and the *Nordwind* – recently completed a number of crossings between New York and the Azores, and during these trips, remarkably low operating costs were obtained. Costs so low, in fact, that the other airlines with their gasoline-engined craft cannot possibly hope to equal them unless they, too, equip their planes with the Diesel.

During these 2,400-mile flights across the North Atlantic, it was found that the fuel consumption of the 600 hp. Junkers "Jumo" 205-C Diesels was so low that a saving of 79.2 lbs. of fuel per hour for each engine was obtained, compared with gasoline operation. Thus for the 16½ hour flight between New York and the Azores, the total saving in fuel consumption amounted to 5,227 lbs. This indeed is an astonishing figure, but one which, nevertheless, has actually been obtained under normal flying conditions!

This saving of 5,227 lbs. in dead weight would be available, of course, for further payload should it be desired, in addition to the regular payload which a plane of this type can carry. Converted into terms of airmail revenue, it is equivalent to the weight of 167,264 letters of ½ oz. each which, if the postal rate were $0.20 each, would bring in a revenue of $33,453 for a capacity load. Even if a certain portion of this payload were to be in the form of express and freight and the receipts therefrom were somewhat less, a revenue of at least $20,000 could be counted upon for each trip.

A Deutsche Lufthansa mailplane in flight across the North Atlantic.

Catapulted and on its way across the ocean! One of the new Hamburger Ha 139 Diesel-engined seaplanes.



Not only does Diesel operation make possible this great increase in payload, but it also greatly reduces operating costs due to the cheaper kind of fuel used and the smaller amount of it consumed. These 2,400 mile flights merely confirmed what Deutsche Lufthansa already knew from its experience with Diesel-engined planes across the South Atlantic. It was found that by using Diesel fuel instead of gasoline, a saving of 78.2 per cent in fuel cost was obtained in regular service!

This saving in fuel cost is said to represent approximately $1,600 for each flight of 2,400 miles, or a saving of $0.66 per mile. Since it is reasonable to assume that two flights will be made each week in each direction, the total saving in fuel cost would thus amount to $332,800 per annum for the New York-Azores portion of the route alone. To this must be added the saving on the Azores-Lisbon portion of the route, and subsequent flights to the larger cities of Europe. It is therefore apparent that Deutsche Lufthansa, by having the common sense to use ultra-modern Diesels in its planes, will be in a position to save at least $500,000 per annum in fuel costs over the North Atlantic.

DIESEL MARINE AUXILIARY UNITS

By JOHN W. ANDERSON

WHILE these Diesel engine driven auxiliary units are designed primarily for marine service, they are entirely suitable for industrial service also. The unit shown here consists of a Diesel engine driving an electric generator, an air compressor, and a bilge pump. It is built in several sizes – principally in 5, 10 and 15 hp. units. Similar units are available with the compressor omitted.

The steel base on which the parts of the unit are mounted is well braced to provide a rigid as well as strong support in order to retain the alignment between the individual members of the unit. The base is electric welded throughout and is arranged for bolting down to the flat surface of a tank top or floor.

The Diesel engine is a standard single cylinder, four cycle Stover engine, rated either at 5 or 10 hp. at 1,000 rpm. according to the size of the unit. This engine is fully described in the *Diesel Engine Catalog* on pages 78 and 79 so that further discussion is unnecessary here, except to note that it can be started by hand cranking. Thus such units are entirely suitable for emergency service, since electric service and starting air are quickly available after starting this unit by hand cranking. However, if it is desired, the 10 hp. engine can be arranged for electric starting also, or the electric generator of either size of unit can be wound so that it can be used for electric starting.

The generator can be furnished for 32 or 115 volt direct current service. It is a ball bearing type machine with screen covers, and has a generous overload capacity. This generator is V belt driven and runs continuously as long as the engine does.

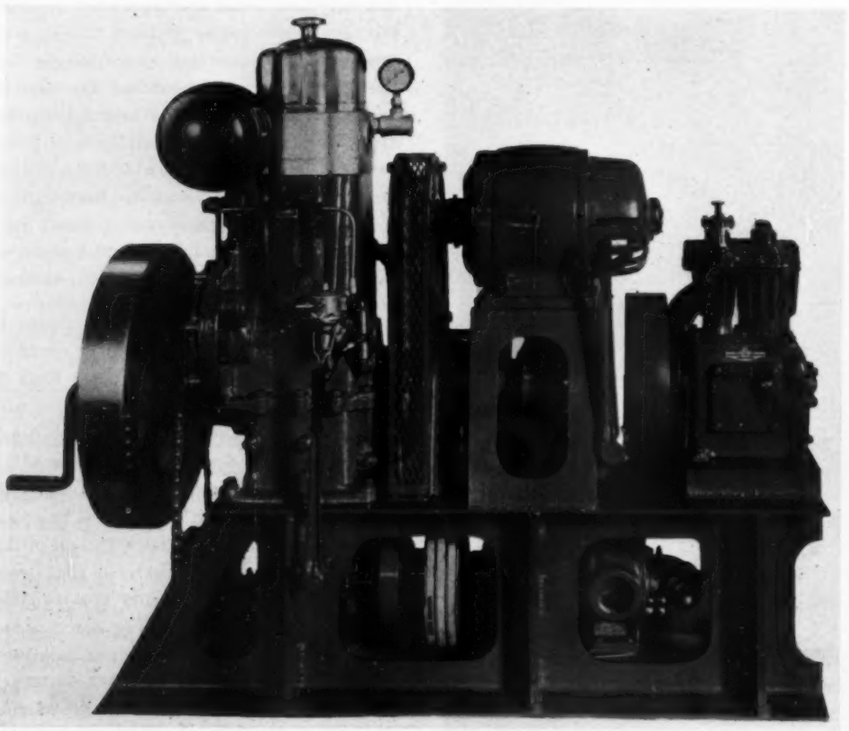
The Quincy compressor is a two stage air cooled machine, capable of delivering air from 250 to 500 pounds discharge pressure. It has Timken roller main bearings and is fitted with an unloader. It is direct connected to the engine through a heavy duty Twin Disc clutch, so that it may be thrown in or out of use at will as long as the engine is running.

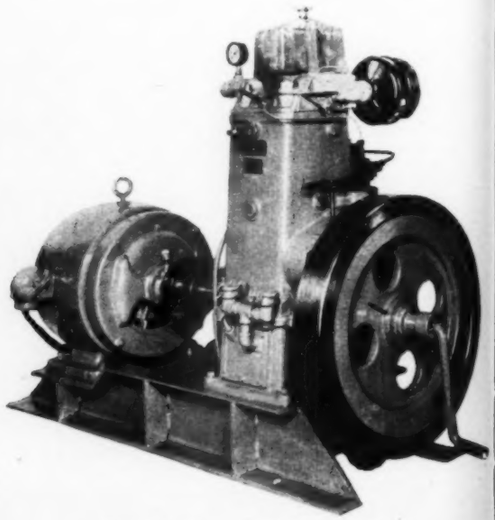
The Viking rotary pump is mounted below in between the side girders of the base, and is driven by a V belt through a Twin Disc clutch, so that it also can be thrown in or out of service as long as the engine is running. The pump usually furnished will comply with the U. S. Steamboat regulations governing fire and bilge pump service.

The accessibility of the various individual members of the unit is apparent from the illustration. In fact, most parts are easily reached from either side of the unit.

The number of items needing attention at installation is a brief one. First, the base is properly leveled and bolted down. Electrical connections are made to the generator. Piping connections must be made to the pumps and compressors. These engines have a small fuel tank inside the engine base, but if desired a connection from the main fuel system of the installation can be made to the auxiliary engine fuel injection pump.

John Reiner & Company are responsible for working out the details of these units.





A Diesel marine auxiliary generating unit with 10 hp. Stover Diesel.

DIESEL ENGINES

By JOHN W. ANDERSON

No. 8. CATERPILLAR

This is but one of 57 engine descriptions which appear in the DIESEL ENGINE CATALOG. *See page 56.*

SEVEN sizes ranging from 33 to 120 hp. for continuous sustained load, or 44 to 160 hp. maximum — that is the "Caterpillar" setup. Built to "take it and like it," these engines are used principally in tractors, road and contractors equipment, and for power units where heavy loads and continuous duty under difficult operating conditions are the rule rather than the exception. As would be expected, the engines are ruggedly built and conservatively rated.

Three-cylinder sizes are used — a 5¾" by 8" built in 3, 4, 6 and V-8 cylinder units running at 850 rpm. governed speed, a 5¼" by 8" built in 4 and 6 cylinders at the same speed, and a 4¼" by 5½" built only in 4 cylinders running at 1,400 rpm. governed speed. This last unit has the lowest power rating of the entire engine line up.

In the services where these engines go, the ability to "hang on" when the overloads come is important. The engineer measures this ability by means of a torque curve. A typical curve of this kind together with other performance characteristics of these engines is shown on the chart (page 26). Although this chart applies specifically to the D13,000 six-cylinder model, all engines in the line have similar characteristics.

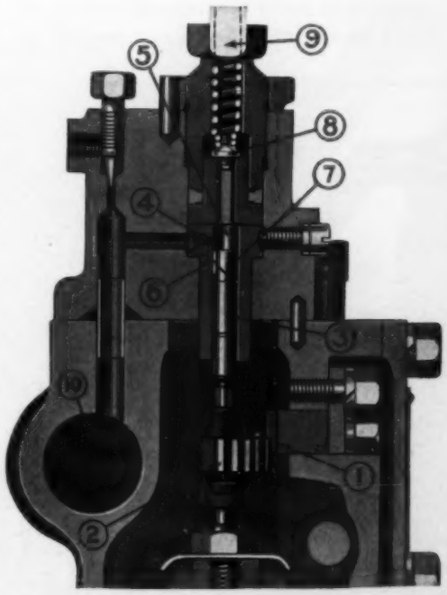
The chart covers the performance from 450 to 1,000 rpm. against a top governed speed of 850 rpm. The conservativeness of the power and speed ratings is obvious. But to go back to the torque curves. The maximum torque, which is a measure of actual engine behavior, rises as the speed drops to around 650 rpm. and then turns downward. But even when the speed falls to 450 rpm., almost one half the rated speed, the torque is still equal to that at full speed. The brake mean effective pressure curve is the equivalent of torque, and the convex shape of the brake horsepower curve again shows the same thing. The shape of the torque curve is controlled by the design of the fuel pumps which are made in conformity to the requirements of "Caterpillar" service.

Such performance characteristics belong to the Diesel combustion system, but they vary according to the individual engine and its fuel system. The "Caterpillar" fuel system is shown in the illustration on page 26. Starting with the storage tank, the fuel flows to the transfer pump, of the gear type. It is delivered to the filters at about 15 pound pressure. The fuel filter is a flat wire coil, one one-thousandth inch clearance, designed to remove silt, fibrous and flat materials. All of these filtering elements are in one casting, readily accessible, and can be quickly cleaned and returned to the filter box without breaking any pipe connections or disturbing any other part of the engine.

From the filters, the fuel flows to the injection pumps, with an individual pump for each cylinder. Referring to the cross section of the injection pump, the fuel enters through the manifold marked 10, and flows upward and enters the plunger chamber through the port 4. This pump is of "Caterpillar" design and manufacture, and its action is as follows. The rack 1 is connected to and actuated by the governor. Sliding of this rack revolves the pump gear 2 which is attached to the bottom of the pump plunger 3. The plunger is actuated by a cam and its stroke is constant. As the plunger lifts, the inlet port 4 is closed, and the fuel trapped in the compartment 5 above the plunger, in the groove 6, and in the space below the scroll 7, is put under pressure. Further upward motion of the plunger forces the fuel up through the check valve 8, through the line 9, and into the injection valve 4 in the general fuel system views. When the scroll edge 7 reaches the port 4, pressure is relieved and fuel injection is terminated. The quantity of fuel injected is determined by the plunger stroke before uncovering the port 4 by the scroll, and this in turn is determined by the position of the plunger which is rotated by the rack. Thus the metering of the correct quantity of fuel is determined by the pump under the direct control of the governor, and the pump controls the time and rate of delivery of the fuel.

But the fuel injection valve and the pre-combustion chamber have important duties also.

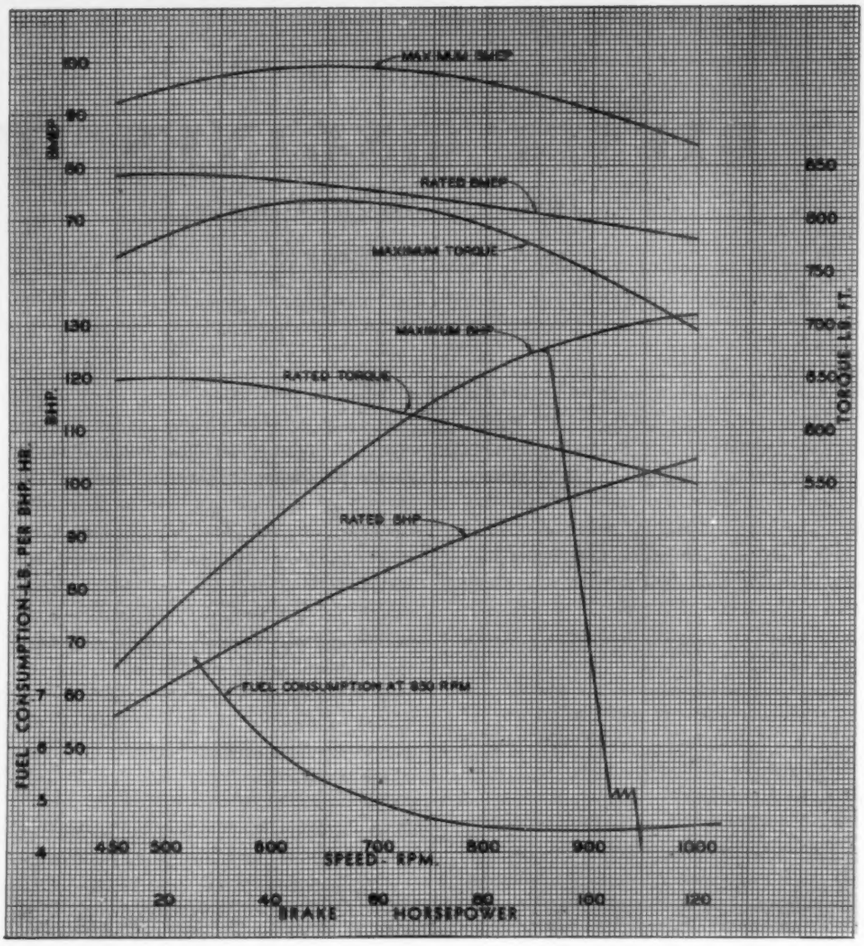
Caterpillar fuel injection valves employ no mechanical means of opening. The spring-loaded valve is lifted by the pressure of fuel from the pump below.



Sectional view of fuel injection pump. Its operation with reference to numbered parts is thoroughly discussed in the accompanying text.

Their construction is shown in the sectional view on page 25. The valve is opened by the fuel pressure created by the injection pump, and it is closed by the spring the instant the fuel pressure is released. Fuel enters through the tubing at the right and passes down through the internal passage to the valve seat, and through the single hole nozzle. Any leakage upward past the valve needle is drained away through the pipe at the top, to the header at the side.

The pre-combustion chamber is specially shaped and is confined within a removable alloy steel piece set into the cylinder head. The atomized fuel injected into the chamber is ignited and partially burns. This preliminary combustion develops a high pressure within the chamber, and this pressure ejects the flaming mixture of fuel particles and gas out into the main combustion space in the cylinder where the combustion is completed. The top of the piston is dished out over a large portion of its top area to provide this main combustion chamber. The outlet hole in the pre-combustion chamber is small enough to impart a high velocity to the fuel and gases ejected so that there is excellent mixing with the air in the main chamber. The pre-combustion chamber is so limited in its radiating surface that the temperature of the metal plus the heat of the air at compression is always sufficient to give positive ignition under all speed and load conditions.

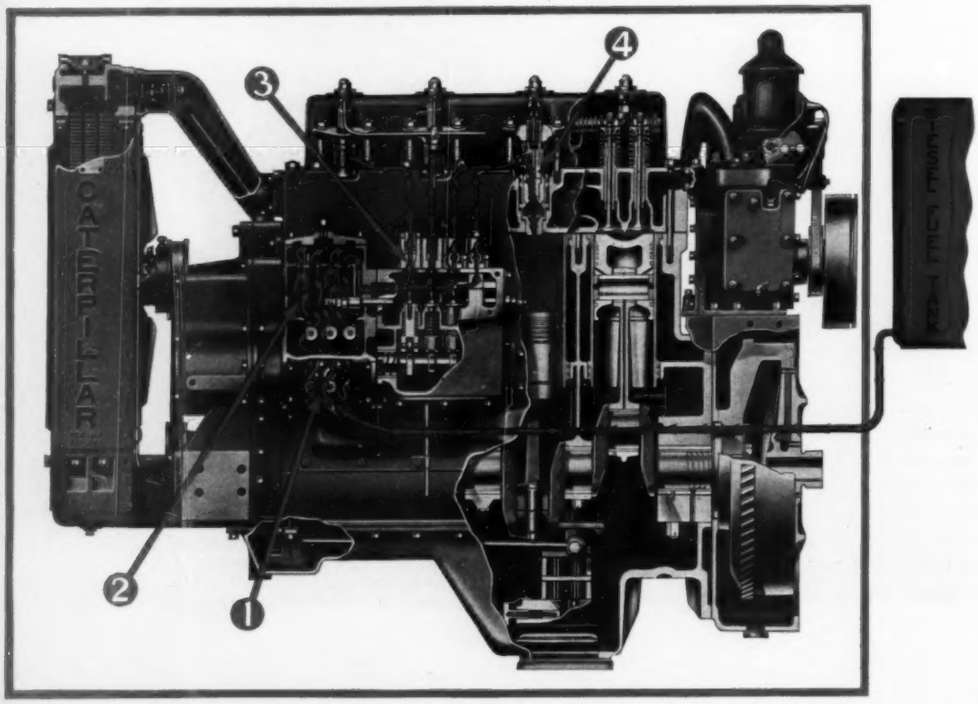


Maximum and rated performance curves for 6-cylinder "Caterpillar" Diesel engine — model D13000. Brake horsepower, brake mean effective pressure, torque and fuel consumption are plotted against speed. Readings corrected to sea level barometric pressure and standard 60 degree F. temperature.

Both the injection pumps and the injection valves are adjusted at the factory and are replaceable in service by simply substituting new units for the old. There are no working adjustments on the job. This is especially important in the case of the fuel pumps in order that there may not be any question of equal division of load among the cylinders of the engine.

The governor is of the spring loaded flyball type. It is mounted on the fuel pump shaft gear which is driven directly from the crankshaft gear. The engine is always under the control of the governor, so that the throttle lever is really the governor spring control. The lever setting determines the approximate speed of the engine, and the governor controls the fuel injection pump to supply the quantity of fuel necessary to balance the load. For ordinary operation, the variation in speed from full load to no load is about 8 per cent. For electric generator service, this speed variation is within 3½ per cent. The engines respond promptly to load changes or to speed changes due to changes in throttle lever setting.

Turning to the mechanical details of the en-



Cross section and color chart for fuel oil, tracing its path from the tank to its explosion in the cylinders. (1) Gear type fuel transfer pump, (2) fuel filters, (3) fuel injection pumps, (4) fuel injection valves.

gine, the cylinder block is in one piece which also forms the upper part of the crankcase and carries the main bearings for the crankshaft. These bearings are bored after assembly in the cylinder block and are doweled to locate them in place. Removable wet type cylinder liners are used, held in place by the cylinder head. In the case of the three cylinder engine, one head is used for the entire engine, but for the four and six cylinder engines there are two heads used. Individual heads are used on the V-8 engine. The inlet and exhaust valves seat directly in the head and have separate bronze stem guides. Valves are operated by push rods and rockers from the cams on the camshaft in the crankcase. These push rods are enclosed in tubes, plainly visible in the outside views of all the engines except the D4400, but the valve operating mechanism on the top of the cylinders is entirely enclosed by an oil tight cover. Note that the fuel injection valves are outside of this cover.

The thrust bearings on the crank and cam shafts are clearly shown. These definitely locate these shafts longitudinally and take any end thrust which may come on them. The picture also shows the counterweights on the crank webs which are supplied on all engines except the D4400, the D11000 and D13000 models. The pistons are of almuninum alloy and carry the full floating type of wrist pin. Aluminum end plugs hold the pin in place and protect the cylinder walls. The connecting rod has a bronze bushed solid eye at the upper end and a removable babbitt lined shell at the low end for the crankpin bearings.

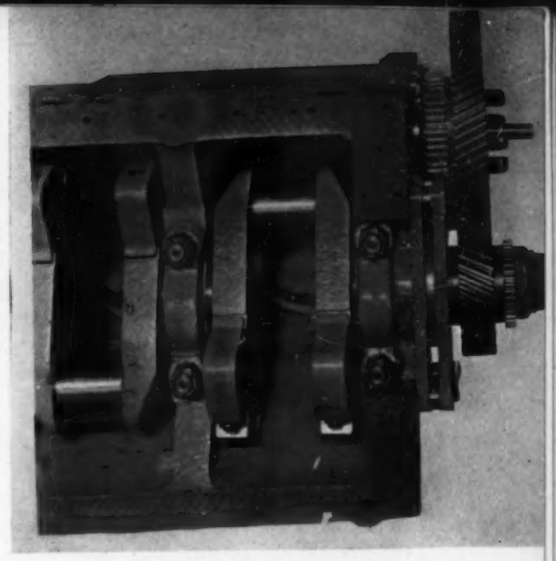
The pressure lubrication system takes care of all of the bearings and other parts which need lubrication. The crankcase pan is formed to provide an oil sump near one end of the engine as shown in the illustration. This sump is deep with steep sides so that the oil will still drain to it and be confined to it even though the engine be tilted to a considerable angle. And there is a horizontal shelf, on the radiator end of the sump, at the top of it to further assist in confining the oil. The oil which drains to the other end of the pan is returned to the sump by a special suction pump which is combined with the pressure pump and which has a suction pipe leading from the suction bell at that end of the pan.

The pressure pump of the gear type is submerged in the oil in the sump and is driven from the camshaft. The pump is protected by a strainer on the suction opening below it, and the relief valve which holds the oil pressure at about 30 pounds is combined in the pump body. The oil delivered from the pump first passes through the filters located on the side of the engine so as to be accessible. Then the oil goes to all of the main bearings, to the crankpins and wrist pins through drilled holes in the crankshaft and connecting rods, and through a pipe which leads up to the valve mechanism on the top of the engine. The camshaft and accessory driving gears are lubricated from oil sprays.

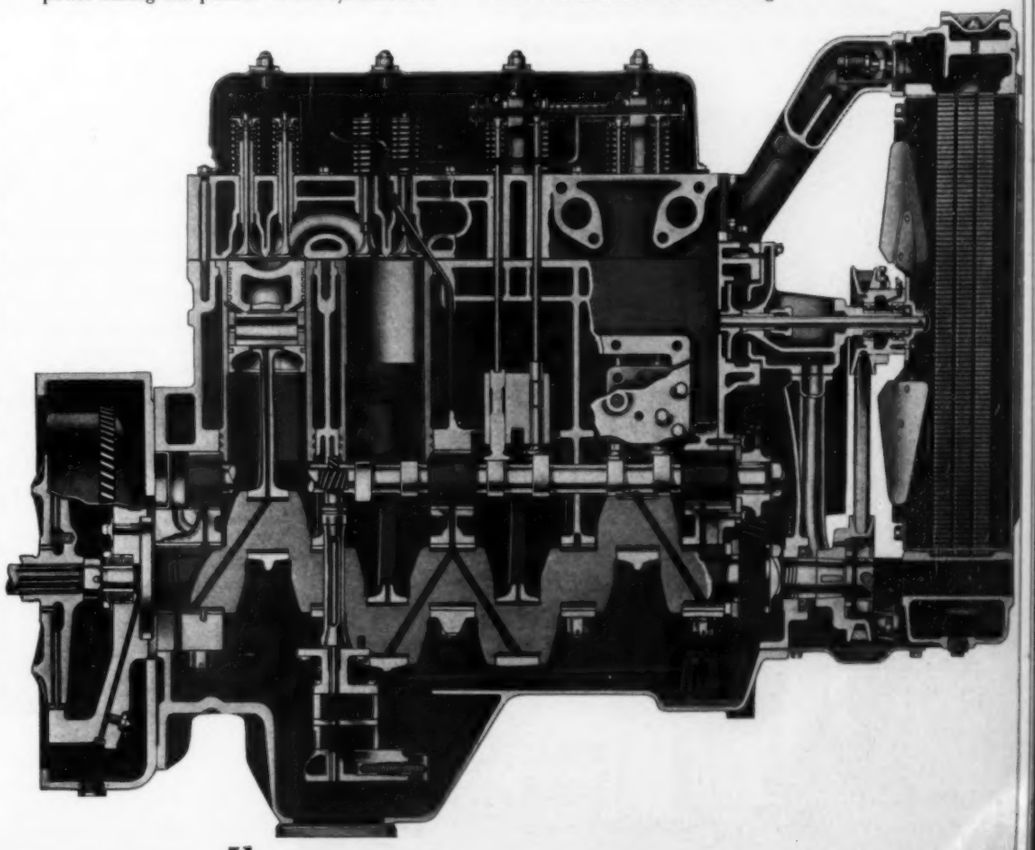
Engines in the services where these usually go must be carefully protected against dust and dirt getting into the crankcase. Consequently every shaft opening is carefully sealed against dust getting in and oil from getting out. The crankcase breather is protected by an air filter, which also acts to keep the lubricating oil vapor in. And of course all of the engine covers are dust and oil tight. One more item on the oil system is important – there are two wiper rings on each piston just below the working rings and above the wrist pin, that keep the oil consumption in check.

Many of these engines are operated out of doors where they are subjected to extremes of temperature. Dependable starting, especially in extreme cold weather, is important, and so Caterpillar adopted the gasoline starting engine as a continuous dependable source of power during this period. A two-cylinder four-cycle engine is used, vertical type on all of the larger Diesels except the V-8, and the horizontal opposed type on the smallest Diesel and the V-8. These gasoline starting engines are complete little units with magneto for the ignition, carburetor, air intake filter, and flyball governor for controlling the speed. The starting engine drives the Diesel engine through a helical pinion and clutch arrangement that engages a ring gear on the Diesel flywheel. As soon as the Diesel begins to operate under its own power, it overruns the starting engine and the starting pinion automatically disengages.

There are three important factors in connection with this method of starting –



A portion of the crankcase to show the location of thrust bearings for both crank and cam shafts.

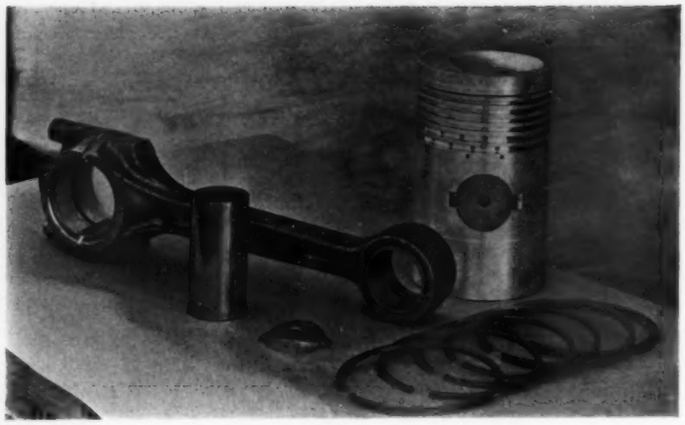


Cross section and color chart showing the path of lubricating oil to all moving parts.

1 – A compression release lever is operated to completely relieve the compression of the Diesel, permitting the starting engine to crank the Diesel, circulating the lubricating oil and generally conditioning the engine for starting.

2 – The cooling water from the Diesel engine circulates through the starting engine block, where it is warmed. This assists materially in warming up the Diesel engine.

3 – After the preliminary conditioning period, the compression release lever is thrown to the running position and full compression is restored to the Diesel. The starting engine is powerful enough to crank the Diesel under these conditions, and the heat of the compression helps to complete the warming and conditioning process. Then when fuel is turned on, the Diesel starts promptly and is properly conditioned and lubricated for regular operation.

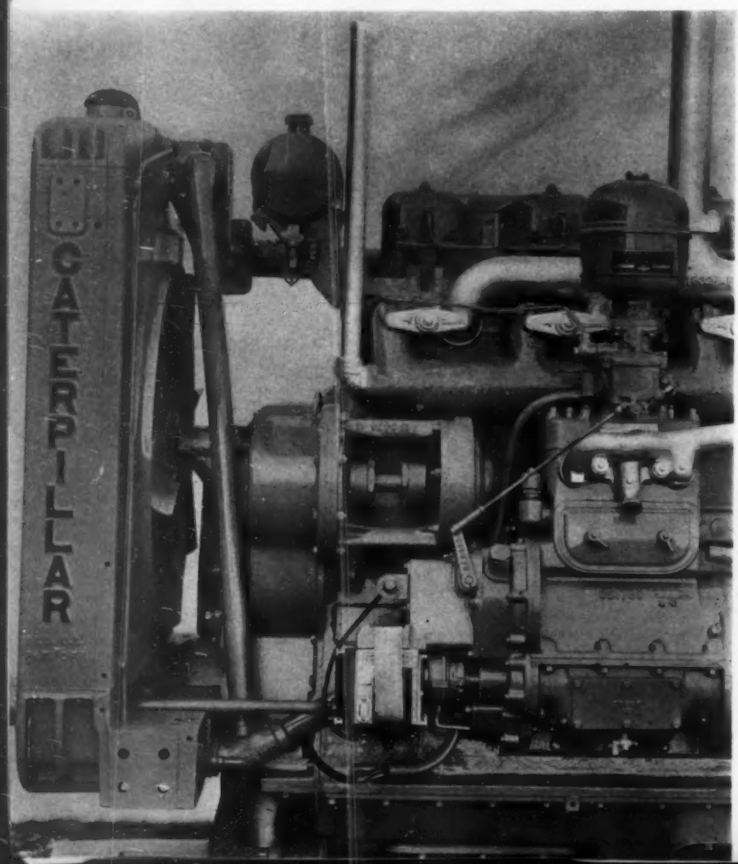


Piston and connecting rod assembly complete with rings and wrist pin.

The cooling system is especially designed to maintain a high enough temperature under all operating conditions to give proper engine performance yet avoid overheating. Practically all of these engines are installed with radiator cooling, and the picture shows the usual arrangement. The engine jackets are designed to provide for a free circulation of the water and good cooling of all of the parts. The water is circulated by the engine driven centrifugal type pump shown in the middle of the picture below. Suction is from the bottom of the radiator, and discharge through the jackets to the thermostatically controlled by-pass valve. This valve acts to maintain the outlet water at the proper temperature and by-passes all or part as may be necessary through a by-pass pipe. The remainder of the water passes to the radiator. The fan is engine driven and the shroud increases the efficiency of the fan and distributes the air flow over the entire radiator to give effective cooling.

Most of the accessories attached to the engine have already been mentioned. There are the fuel injection pumps, the governor, the fuel and lubricating oil filters, the circulating water pump, and the radiator fan. The precautions taken for clean fuel and lubricating oil, and a tight crankcase, have also been discussed. But there is an additional major item – the intake air cleaner. It is of ample capacity, of the wet type, and can be plainly seen in the general views of the engines.

The mounting of these engines varies according to the application. For tractors and various types of construction equipment the engines are mounted right on the machines and become a part of them, but there is always a clutch for entirely disconnecting the engine from its load. Power units are usually mounted on steel channel skids, except for generator work frequently with an extension drive shaft connected to the engine through a clutch. The fuel tank is at one end of the engine with the radiator at the other, and a hood connects the two on top and covers the entire unit. Such a power plant is completely self-contained, and only needs to be bolted down and connected to its load to be ready for business.



"Caterpillar" cooling system. The shrouded, six bladed fan and large area radiator are ample for all operating conditions. An extra-large by-pass provides for rapid warming of engine when starting. The temperature of jacket water is thermostatically controlled, of course.

These engines are a reflection of their background, and their background includes the long years of experience of the Caterpillar company in building gasoline engines, tractors, and road machinery, plus several years of intensive research and development work on the Diesel engine looking towards the type of unit which "Caterpillar" felt would best meet the operating conditions which they had learned from experience to know so well. In the design, special emphasis has been placed on having as few parts as possible which require field adjustment.

By means of this inherent simplicity, the general running requirements of these engines can be attended to by unskilled operators. Vital parts which may eventually need replacement are so designed that this service work may be easily and quickly done and at a moderate cost.

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For the cooling of jacket water there is a Heat Exchanger designed for use as an inter-cooler. Used in a closed circuit system, it permits only fresh water to be circulated through the jackets. This insures freedom from corrosion and prevents the accumulation of silt and scale that occurs with direct cooling—especially when salt water is used.

Harrison engineers will be glad to cooperate with you in determining the type of Heat Exchanger that is best suited to your requirements. Bulletin and data sheet will be sent upon request.

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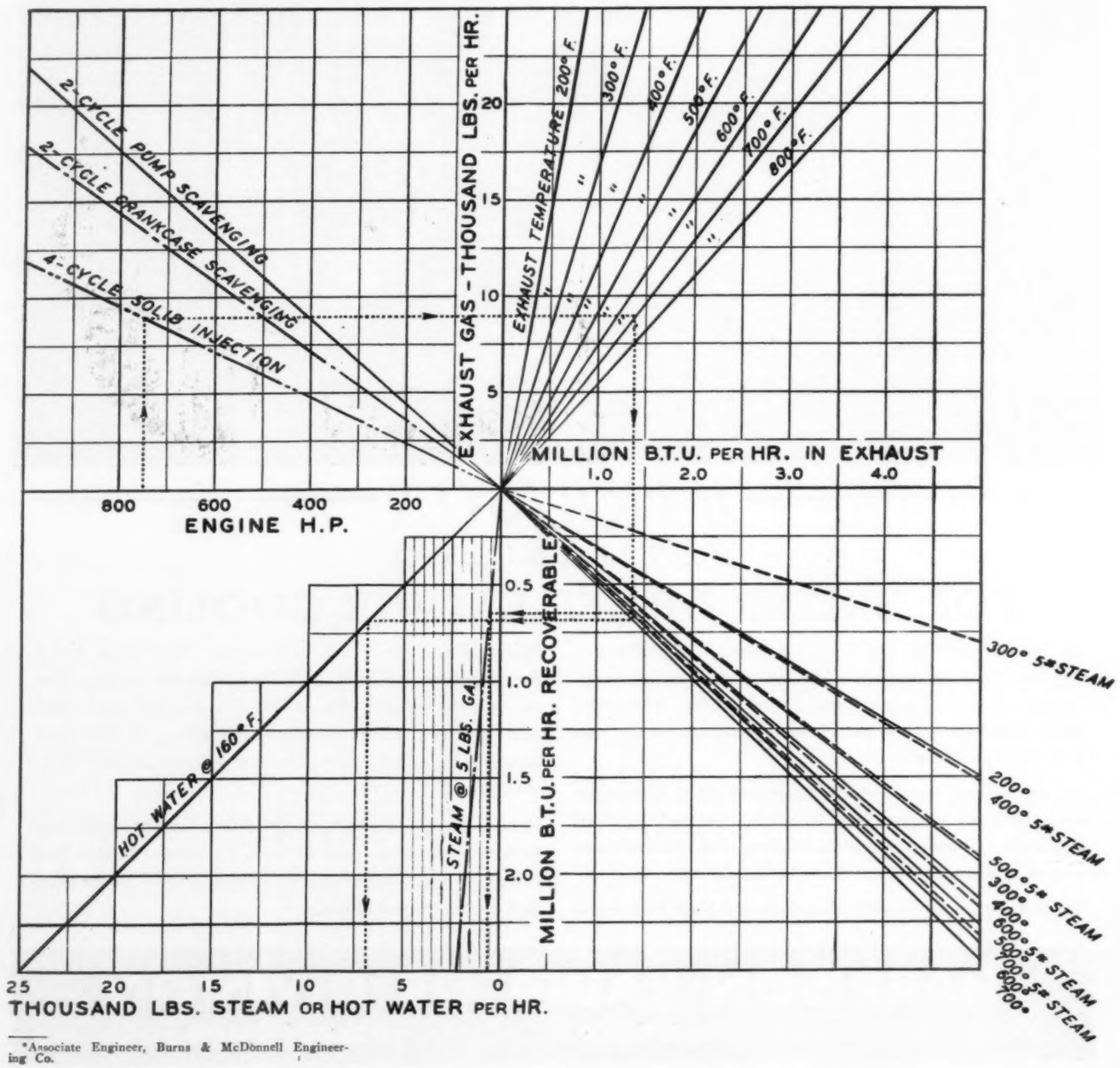
CHART PERMITS RAPID CHECK OF DIESEL ENGINE WASTE HEAT RECOVERY

By GLENN C. BOYER*

IN order to facilitate the determination of the amount of heat that can economically be recovered from the exhaust gases of a Diesel engine, the writer has found the accompanying chart an invaluable aid. With the rated horsepower of the engine under consideration known as well as the type of engine and the exhaust gas temperatures at various engine loads, the following items can be obtained in succession:

1. Quantity of exhaust gas per hour, which value remains practically constant for all engine loads.



*Associate Engineer, Burns & McDonnell Engineering Co.

2 Total heat in the exhaust about 60°F for various engine loads, knowing the exhaust temperature for each of the loads considered.
3. Total heat economically recoverable in btu. per hour either as low pressure steam or hot water.
4 Total quantity of hot water or steam produced with an inlet water temperature of 60°F.

The example shown on the chart by means of the dotted lines and arrows is a 750 hp., 4-cycle engine, considered to have an exhaust gas temperature at full load of 700°F. The chart shows that approximately 8,000 pounds of exhaust gas are available per hour, carrying approximately 1,400,000 btu. of heat above 60°F. In the lower right-hand portion of the chart is a series of solid lines to be used for determining the quantity of heat economically recoverable as hot water, while the dashed lines in the same portion of the chart are to be used for determining the quantity of heat economically recoverable in the form of steam at 5 pounds gauge pressure. The temperature values carried by these lines correspond to the exhaust gas temperature under consideration; in this example 700°F. Thus with a total of 1,400,000 btu. in the engine exhaust, 650,000 btu. can be recovered in steam at 5 pounds gauge pressure or 700,000 btu. can be recovered in the form of hot water. Following the dotted lines through the lower left-hand chart, it is seen that approximately 600 pounds of steam at 5 pounds gauge pressure or 7,000 pounds of hot water at 160°F. can be produced.

A similar procedure will show the quantity of heat that can be recovered at a fractional load on the engine. If, for example, at three-fourths load on the engine the exhaust temperature is 550°F, and with the quantity of exhaust gas remaining constant, the total quantity of heat in the exhaust will now become 1,100,000 btu. per hour, of which amount 400,000 btu. can be recovered in the form of steam at 5 pounds gauge pressure and 500,000 btu. can be recovered in the form of hot water at 160°F.

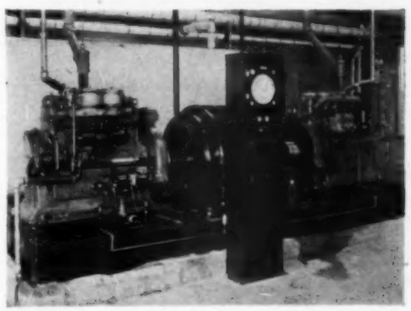
This chart has been developed for three types of Diesel engines and certain assumptions have of necessity been made in order to simplify the upper left-hand portion of the chart. It has been assumed that a 4-cycle solid injection engine would exhaust 12 pounds of gas per brake horsepower per hour, that a 2-cycle crankcase scavenging unit would exhaust 18 pounds of gas per brake horsepower hour, and that a pump scavenging engine would exhaust 22 pounds of gas per brake horsepower per hour. Should the person using this chart desire to consider an engine exhausting a different quantity of gas from any of those engines given, it is a simple matter to draw in a straight line on the upper left-hand portion from the origin through the point corresponding to the total weight of exhaust gas at full load. Thus if an engine to be considered exhausts 15 pounds of gas per horsepower hour, a 1,000 hp. engine would exhaust 15,000 pounds of gas per hour. Connecting this value of 15,000 pounds of gas per hour at 1,000 hp. with the origin by means of a straight line will permit the ready determination of the quantity of exhaust gas from any unit from 0 to 1,000 hp.

The curves in the upper right-hand portion of the chart have been developed from a consideration of the specific heat of air, and the temperature rise of the gas. For determining this series of curves, it was assumed that the air temperature entering the engine was 60°F, and that the specific heat of air was 0.244 btu. per pound per degree temperature rise. Thus with an exhaust temperature of 400°F and an entering air temperature of 60°F, the temperature rise is 340°F per pound. With a specific heat of 0.244, each pound of gas leaving the engine at 400°F carries 340 x 0.244 or 82.96 btu. Values for other exhaust gas temperatures were obtained in a similar manner.

As previously mentioned, the curves in the lower right-hand portion are used for determining the amount of exhaust heat which can be recovered economically and are based upon experimental data.

The writer has found that this chart, constructed on a sheet of cross-section paper 20 inches by 20 inches is very convenient for office use. Paper divided 10 parts to the inch is used, and the curves plotted on each of the four quadrants of the sheet, each set being on a 10 inch by 10 inch section.

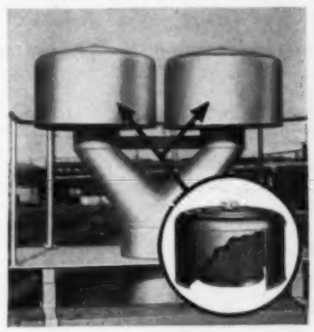
AUTOMATIC STEAM AND HERCULES DIESEL ELECTRIC PLANT at EAST BROOKFIELD, MASS.



WHAT is believed to be the first automatically balanced steam and Diesel electric generating plant ever installed is now in operation in the plant of the Maclan Hat Company, Inc., East Brookfield, Mass. An electric generator, driven by two 6-cylinder Hercules DRXB, 4⅜ x 5¼ Diesel engines, is arranged to run in parallel with a steam-engine-driven generator. The power output of the Diesel unit is controlled by the exhaust pressure of the steam-driven unit so that the demand for Diesel power and steam power for process purposes is balanced. The plant is controlled automatically by means of a techomatic control cabinet installed by the Thermal Engineering Company, of Boston. Hercules Diesels have been used by this company for a number of other unusual automatic Diesel electric plants in various parts of the East.

MULTIMAZE AIR FILTER

AMONG the various types of air filters available today is one that might well be called an "all purpose" unit. It is the Multimaze air filter manufactured by the Air-Maze Corporation. A typical exterior multiple installation of two hooded Multimaze units is illustrated. Construction details are seen in the inset.



The Multimaze is a compact, cleanable metal fabricated air filter of patented construction. It is obtainable in various sizes for internal combustion engines, air compressors, blowers and air conditioning systems. Air cleaning efficiency is claimed by the manufacturer to be better than 99 per cent; restriction less than ⅛" H_2O. A Multimaze installation requires a negligible amount of space even when the application demands thousands of c.f.m. per minute. Servicing is simple.

WAUKESHA EXPORT

MAX HOFMANN has just been appointed to the position of Export Sales Manager of the Waukesha Motor Company, succeeding M. E. Nicklin.

An engineer of considerable experience, Mr. Hofmann joined the Waukesha Motor Company in 1926, coming from the Argentine branch of Korting Brothers, German Diesel engine building firm. His work there as a Diesel installation engineer, his subsequent journeys throughout Europe, Africa and both Americas, and his ability to speak four languages fluently make him well qualified for his new position.

During the last few years, with export business becoming more and more important, Mr. Hofmann has devoted much of his time to Waukesha's activity in this field. His engineering training has been applied to foreign sales and installation problems, and he has made a number of visits to Latin America in this capacity.

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Described in Detail by JOHN W. ANDERSON
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Deschamps—Aviation
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Fifty-seven different models described and illustrated in color and full section.

THIS new book on Diesel engines is entirely different from any other book previously published on the subject. In this new book fifty-seven Diesel engines are described in detail, illustrated in color and in full section.

John W. Anderson, author of the well-known book "Diesel Engines;" editor of "Diesel Application Planbook, Vol. One" and contributing editor to DIESEL PROGRESS, one of the most experienced and best known engineers in the Diesel industry, has described in intimate detail these fifty-seven Diesel engines. In this book he goes into the matter of individual design, discusses the features of design of each engine in clear cut, thoroughly understandable manner and makes it possible for the reader to grasp readily and quickly the differences between the various makes and types of engines now available on the market. He makes it possible to select from these fifty-seven different models the one engine fitted to the job in mind.

Beautifully illustrated in color, with sectional drawings vizualizing with complete clarity the design features of each engine, this new book brings you under one cover a marvellously clear picture of the engines now available. Right up to the minute, as modern as tomorrow, printed on a big page size (10¼" x 13½") to make the illustrations readable, this new book is indispensable to the Consulting Engineer, Diesel Salesman, prospective Diesel engine buyer—yet the price is but $3.00 postpaid.

In addition to the section of this new book devoted to engine descriptions, nearly 150 pages of additional material of vital interest to you will be found immediately following the engine articles — see chapter headings hereunder. Your particular attention is drawn to the "Birth of the Diesel Engine" chapter because here you will find how the Diesel engine started, who was Dr. Diesel, what happened to him —original data never previously published on his early trials and tribulations—an intensely interesting chapter.

The blueprint section of the book, following the style set by volume one of the DIESEL APPLICATION PLANBOOK last year, will be found worth the price of the book. Eighty odd pages of new plans, new applications, bringing you up-to-date with what has happened during the past year in applying Diesel engines to varying power problems.

We offer you this new book believing it to be the finest book of its type ever produced, authoritative, informative, beautifully printed and bound—a book you will be proud to own, a book from which you will obtain much useful information. May we hope you will use the coupon hereunder to-day—now.

ADDITIONAL CHAPTER HEADINGS

(1) The Birth of the Diesel Engine
(2) Vibration Elimination
(3) Noise Elimination
(4) Flexible Connections
(5) Air Filtration
(6) Ponca City, Okla.
(7) Department Store Application Study
(8) Port Clinton, Ohio
(9) Sailors Snug Harbor
(10) Chicago Diesel Fire Boat
(11) 580 Fifth Ave., New York
(12) Mobile Ice Plant
(13) New York University
(14) Parke Davis Company
(15) Imperial Irrigation District
(16) LaPorte City, Iowa
(17) 8000 kw. Shanghai Plant
(18) 15,000 kw. Hydro Standby plant
(19) 22,000 hp. Mine installation
(20) Combination Hydro-Diesel-Steam
(21) French Community installation
(22) Paris, Texas, Observatory
(23) Langbein Cutlery Company
(24) U.S. Coast Guard vessel

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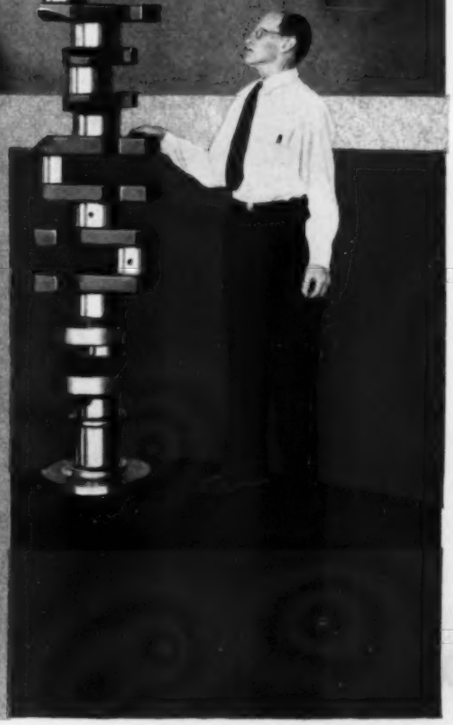
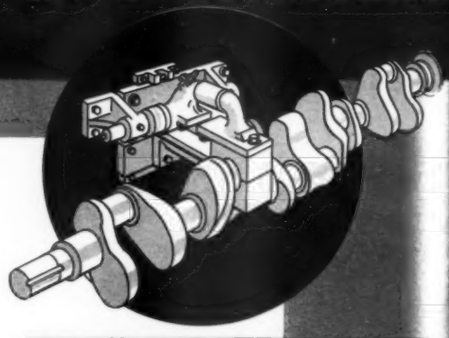
THE tempo of modern mass production has demanded a faster, more efficient method of surface hardening. To meet this demand the engineers of The Ohio Crankshaft Company have perfected the TOCCO PROCESS of surface hardening by electrical induction—a process that reduces the hours required for surface hardening to *seconds* and produces a scientifically regulated, exact result far superior to the surfaces produced by the old methods.



● The Tocco Process of surface hardening by electrical induction is readily adaptable to crankshafts and other parts of widely varying size—from the small automobile steering gear and water pump parts shown in the group picture above to the 1000-pound, eight-cylinder Diesel engine crankshaft shown at the right.

DEMAND FOR TOCCO HARDENING BRINGS 1,100 PER CENT PRODUCTION INCREASE IN TWO YEARS



CAMSHAFTS NOW HARDENED BY TOCCO PROCESS

The pronounced success of Tocco-hardened crankshafts and improved results obtained with equipment including these crankshafts have produced a demand for other parts hardened by the TOCCO PROCESS. Anticipating this demand, Tocco engineers have perfected Tocco-hardening for camshafts. Final experiments and tests have been completed and now for the first time Tocco-hardened camshafts are available to engine manufacturers. These camshafts incorporate the same features and wear-resisting qualities which make Tocco-hardened crankshafts so far superior to all others.

TOCCO camshaft-hardening equipment recently installed in the plant of one of the large automobile companies in Detroit, Michigan.

Costing less than shafts hardened by the carburizing method, Tocco-hardened camshafts are far more satisfactory in engine use than shafts hardened by that or any other of the methods previously employed.

The TOCCO PROCESS of Surface Hardening by Electrical Induction

The TOCCO PROCESS of surface hardening by electrical induction produces an exact result. It is a selective process and the hardened surface is kept within close limits both as to area and depth of penetration. Shafts and other parts can now be hardened quickly at small cost and at the *wearing surfaces only* to 58-60 "C" scale Rockwell hardness (600 Brinell). The heating factor is an electric current induced in the surface area to be hardened, by the current in an inductor block surrounding, but not touching, the surface being treated. When the area to be hardened has been subjected to an accurately controlled, high-frequency current for the correct length of time the electrical circuit is opened and simultaneously the heated surface is quenched by jets from a water jacket built into the inductor block. The surface-hardened zone blends into the core with no sharp line of demarcation and, consequently, no opportunity for flaking or spalling.

•

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MAINTENANCE AND OPERATING COST

LEADING MANUFACTURERS QUICK TO ACCEPT PROCESS WHICH SAVES ENGINE USERS' MONEY

TOCCO-HARDENED CRANKSHAFTS, CAMSHAFTS AND OTHER PARTS PRODUCED IN RAPIDLY INCREASING QUANTITIES

JULY, 1935—1,000 UNITS: So widespread has been the acceptance of the TOCCO PROCESS by manufacturers of engines, trucks, buses and other equipment that, in two years, production of TOCCO-hardened crankshafts has increased 1100 per cent. In July, 1935 approximately 1000 units were TOCCO-hardened—as shown on the accompanying graph. (Bottom, left).

SEPT., 1937—12,000 UNITS: By September, 1937 the production of TOCCO-hardened crankshafts has increased to 12,000 units per month—twelve times as many as two years before! Not only are the *manufacturers* enthusiastic, but the *operators* of automotive, agricultural and marine equipment are likewise gratified because TOCCO-hardened parts mean such important reductions in operating and maintenance costs.

The remarkable savings in maintenance expense in vehicles powered by engines with TOCCO-hardened shafts are proved in the following reports from customers to manufacturers:

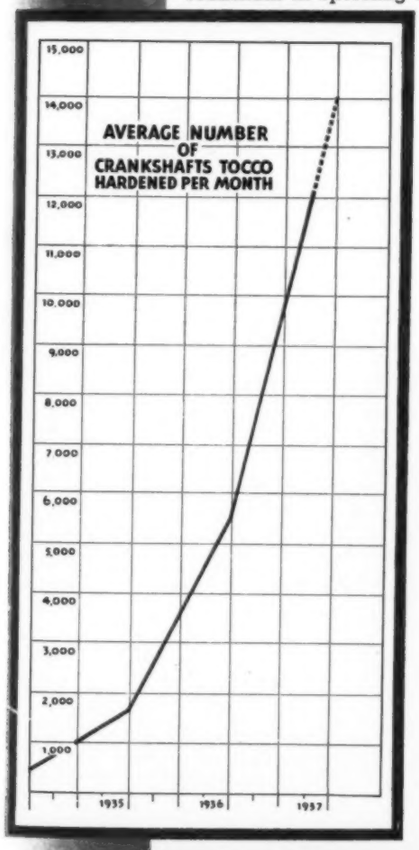
"100,000 miles without a bearing adjustment!"

"Oil pressure gauge reading has not dropped in 80,000 miles, indicating no crankshaft wear."

"Oil consumption same as a new engine after 75,000 miles, due to original bearing clearances and perfect condition of TOCCO-hardened crankshaft journals."

"Former mileage period before regrinding crankshafts increased four times."

"Engine operating speeds stepped up 10 to 20% by use of harder bearing metals on TOCCO-hardened shafts without danger of pounding out or burning out connecting rod big ends."



Wide Acceptance Among Manufacturers

Listed among the manufacturers who make TOCCO-hardened parts available for equipment sold to their customers are many of the foremost engine, truck, bus and equipment builders in the world:

Ambrose Shardlow, Ltd., Sheffield, England
Autocar Company
The Cleveland Tractor Company
The Cummins Engine Company
Deutsche Edelstahlwerke A.-G., Krefeld, Germany
Diamond T Motor Car Company
General Motors Corporation
Hercules Motors Corporation
Houdaille-Hershey Corporation
International Harvester Company
The National Supply Company
Twin Coach Company
Waukesha Motor Company
The White Motor Company

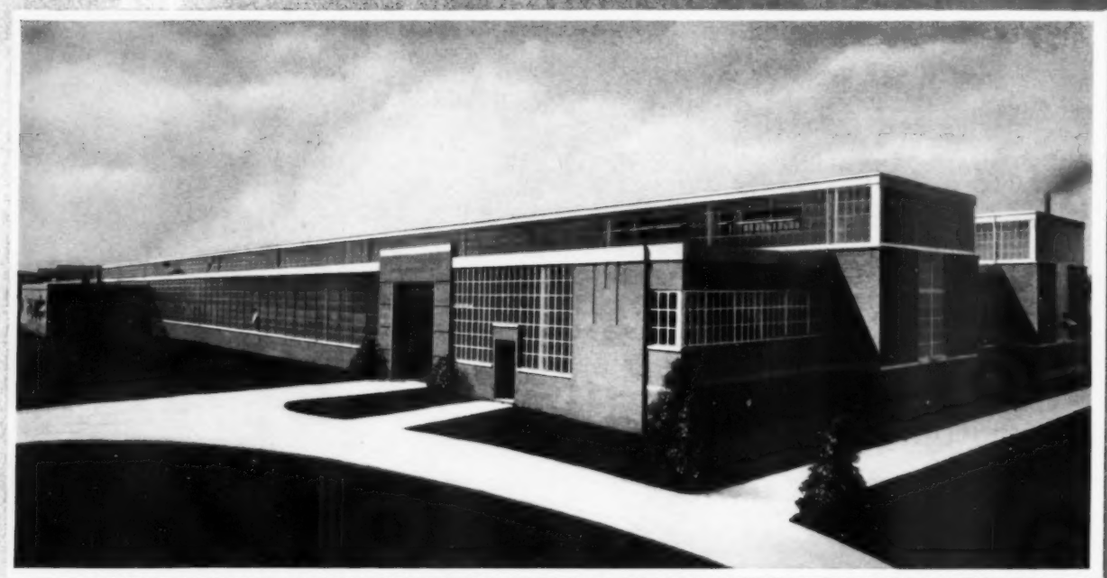
—and many others.

European Representative: Electric Furnace Company, 17 Victoria St., London, S. W. 1., Eng.

Typical installation for hardening crankshafts by the TOCCO PROCESS.

LOWERED THROUGH MINIMUM WEAR

NEW PLANT TO STEP UP PRODUCTION FACILITIES



New, $700,000 plant of The Ohio Crankshaft Company in Cleveland. Operations here double present capacity for machining and Tocco-hardening of crankshafts and other parts. Additional space in present plant will house manufacture of Tocco-hardening equipment installations.

New USES FOR TOCCO PROCESS CONSTANTLY DEVELOPED

The TOCCO PROCESS was originally developed for the hardening of bearing surfaces on crankshafts. Its immediate success and wide acceptance in this field rapidly led to an expansion of its applications. Today, many thousands of camshafts as well as crankshafts are being hardened by this process with the same, improved results. In recent months the use of the process has further been enlarged by its application to the hardening of axle shafts, front-wheel spindles and steering gear Pitman arm shafts, etc. The most recent developments include the use of the TOCCO PROCESS for hardening the peripheral surfaces of wheels on railroad cars and the hardening of other rail equipment. Experimental work is approaching completion on the hardening of many parts used in other varying types of machinery.

BUILDING HOUSES $100,000 RESEARCH LABORATORY

The new factory of The Ohio Crankshaft Company in Cleveland houses a $100,000 research laboratory which is the finest of its kind. Here further research will be carried on in the field of surface hardening by electrical induction. Elsewhere in the plant new equipment has been installed which will machine and harden crankshafts weighing up to 2000 pounds—such as those used in the large Diesel engines for locomotives.

THE OHIO CRANKSHAFT CO. *Cleveland, Ohio*

COOPER-BESSEMER ISSUES BROCHURE ON MEEHANITE METAL FOR ENGINE CASTINGS

IN a recently published booklet, the Cooper-Bessemer Corporation has formally announced an added and exclusive feature to the qualities of their well known Diesel and gas engines for both marine and stationary service. As one of forty-nine licensees in Europe and America, this century-old concern advances still further in modern methods of manufacture through the use of the Meehanite Process in producing engine castings.

Its basic principle discovered in 1923, the Meehanite Process has been steadily perfected and is today completely protected by a long list of foreign and domestic patents. In 1935, the Cooper-Bessemer Corporation secured exclusive rights to the production of Meehanite Metal for its use in the manufacture of gas and Diesel engines, air and gas compressors, pumping powers and oil field machinery and equipment.

Unusual advantages are claimed for castings made by this process and photomicrographs, data, and performance records certainly bear out such claims. The fact that these castings are available at only very slightly higher cost than ordinary gray-iron products is of significant importance.

It is said that the uncertain strength of gray-iron castings is due largely to the irregular physical makeup of the metal itself. Uniform physical characteristics in every section of a casting of varying thickness has always been exceedingly difficult to obtain. With the Meehanite Process, uniformity of graphite distribution and absence of porosity is achieved.

Through the choice of base metals with known physical characteristics, and free from primary or mechanical weaknesses; then by the Meehanite method of exact control and the addition of certain materials, the formations of graphite flakes and nature of the matrix are precisely governed. Close-grained, uniform castings, with attributes that exactly meet the specific requirements – with all the qualities of a true alloy iron – are thus achieved.

Charts and graphs in this comprehensive brochure show that Meehanite Metal castings are of uniform hardness throughout the section, which is an indication of good density. Photomicrographs of this metal show a very uniform distribution of small graphite flakes in a fine grained pearlite matrix. The process is said to afford castings with any desired

tensile strength from 30,000 to 50,000 pounds per square inch in the as-cast condition. By special heat-treatment of certain grades, tensile strengths as high as 75,000 pounds per square inch are obtainable. Excellent fatigue strength and resistance to growth are claimed.

A limited number of these brochures are available. Requests must be written upon company stationery addressed to the Editor, 2 West 45th St., New York, and state the writer's position.

VIBRATION BULLETIN

A NEW 16-page bulletin entitled "Eliminating Vibration Losses" has been announced by the Korfund Company.

This booklet describes the application of Korfund Anti-Vibration Products to various types of moving machinery for the elimination of the transmission of vibrations. It contains much new and useful information on the problems involved in vibration control. Free copies are available upon request to DIESEL PROGRESS, 2 West 45th St., New York.

TEMPERATURE CONTROL BULLETIN

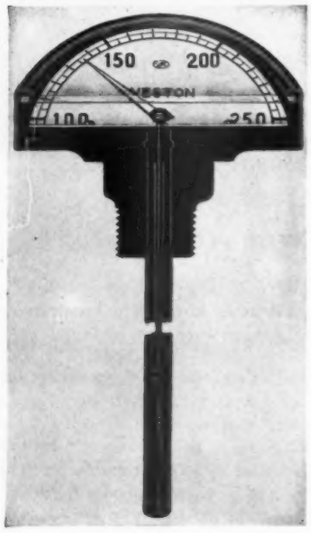
FULTON SYLPHON COMPANY have just issued a bulletin illustrating and describing various Diesel engine accessories which they produce. This is exceptionally well done and informative. The readers of DIESEL PROGRESS may obtain a copy of this bulletin by writing the Editor, 2 West 45th St., New York City.

BUDA DIESEL PORTABLE ICE MACHINE

AMTORG TRADING CORPORATION has recently purchased from the York Ice Machinery Corporation of York, Pennsylvania, a portable Flak-Ice Machine powered by a Model 4-D-186 Buda Diesel Engine. The entire equipment, consisting of a 5" x 5" ammonia compressor, an economizer, a Flak-Ice Machine having a capacity of 5 tons per 24 hours, a Westco pump, a brine mix tank, a brine cooler, a Starr 5 kw. generator, and the engine and fuel oil supply tank, are mounted on an 8 ft. x 22 ft. Fruehauf Trailer.

This particular Flak-Ice assembly is being sent to Russia to demonstrate that similar portable ice-making equipment is suitable in remote districts where there are large farms, but no ice plants for preserving products. There are many advantages in the use of machines of this type that can move from place to place. The low cost of Diesel fuel, as compared with gasoline, and the operating economies of the Buda Diesel make it an ideal power plant for a portable machine of this type. The model is the smallest Diesel engine built by The Buda Company. It is their 4-cylinder model, with 3⅝" bore, 4½" stroke, and 186 cu. in. displacement, developing 26 hp. at 1,450 rpm.

NEW TEMPERATURE GAUGES FOR DIESEL ENGINES



THE initial units in a line of modern temperature gauges which differ materially from any previous type of industrial indicating thermometer have just been introduced by the Weston Electrical Instrument Corporation, Newark, N. J. These new instruments are of the modern dial-and-pointer type, said to be the first industrial application of a new "coils-within-coils" design for the bi-metal temperature-sensitive element. This all-metal temperature element is sheathed within a stainless steel stem. The circular dial case, 3 in. in diameter, is mounted at right angles to and at the top of the stem. Accuracy is guaranteed to 1 per cent over the entire scale.

Two models are being introduced for use in the Diesel engine field: (1) for water and oil temperatures, the scale reading from 50 to 300 deg. F. Its stem length is 2½ in. and the installation connection is ½ in. S.P.T. (standpipe thread). (2) For exhaust gas temperatures, the scale reading from 200 to 1,000 deg. F. The stem is 6 in. and the connection is ½ in. S.P.T.

The scale divisions of the circular dial are easy to read; the anodized aluminum dial face offers a distinct advantage, since this type of metal scale is unaffected by the temperature to which the head may be subjected.

The construction of the temperature element is inherently rugged and durable, with the result that the temperature gauge can easily withstand engine vibrations. Due to its all-metal temperature element, it responds rapidly to temperature change. In addition, reasonable over-temperatures do not harm the gauge or affect its accuracy.

For further details and information address inquiries to The Editor, 2 West 45th Street, New York City.

MAX H. SCHACHNER

APPOINTMENT of Mr. Max H. Schachner as Assistant Sales Manager of the Winton Engine Corporation, subsidiary of General Motors, is announced by Mr. William J. Davidson, General Sales Manager of Winton. His principal responsibility will be direction of the sale of the new Winton two-cycle Diesel engine to manufacturers and distributors.

Mr. Schachner is a native of Chicago. He was graduated from the Central Day Preparatory School in Chicago and received his M.E. degree from Syracuse University in 1927.

After a three-year apprentice engineer's course with the Continental Motors Corporation, one year of which ran concurrently with his work at Syracuse, Mr. Schachner joined the then newly organized industrial engine sales division of Continental. He served as sales and field engineer in the Midwest, calling on manufacturers of industrial machinery until 1934.

In January, 1934, Mr. Schachner joined the Caterpillar Tractor Company at Peoria, Ill., in the Diesel engine industrial sales division. He supervised Diesel sales to distributors and dealers and was editor-in-chief of Caterpillar's Application Data Book for Diesel engines.

Mr. Schachner comes from a family of engineers. His grandfather, Whitcomb Judson, was chief engineer for the McCormick Deering Company, and incidentally, was the inventor of the zipper. Two uncles, Arthur Tabin and R. W. Judson, founded Continental Motors Corporation.

S.A.E. NEWS

As the number of automotive Diesels in service increases, S.A.E. debates on gasoline vs. Diesel engines grow in number and intensity. One of them was staged at the special summer meeting of the Baltimore Section of the S.A.E. held August 27, at Braddock Heights, Md., the only formal meeting of the S.A.E. held last summer, in which Col. Paul Weeks was pitted against Errol Gay, as champions of Diesel and gasoline engines, respectively. Another is scheduled to close the S.A.E. National Regional Fuels and Lubricants Meeting, Tulsa, Okla., Sept. 30 to Oct. 1. Here the resolution will be: "That the Diesel-Type Engine May Be More Desirable Than the Gasoline Engine for Automotive Equipment." Students of Tulsa University will argue the affirmative, and those of University of Oklahoma will take the negative.

• • •

The complete program of the S.A.E. Fuels and Lubricants Meeting at Tulsa lists titles of three timely papers on Diesel and oil engines. Subject of the paper by C. L. Cummins is "The Development of the Diesel Around Oil Country Problems;" A. F. Campbell will discuss the "Economic Place of the Oil Engine," and Robert Best's paper is called "Essentials of Fuel Utilization in Diesel Engines of the Automotive Type."

• • •

Less than $4,000 will purchase one of the Universal single-cylinder test engines now being developed by a volunteer S.A.E. committee group with the cooperation of the Waukesha Motor Co., if orders for five engines, or more, are received, according to Waukesha. Revised blueprints of this engine, which is adaptable to a wide range of Diesel testing, have been circulated to all who have indicated an interest in purchasing the machine. This cost figure includes the crankcase assembly with two-piece crankshaft and four oil pumps – but does not include a cylinder, piston, or connecting-rod.

News of recent developments of the aircraft Diesel in Europe is reaching S.A.E. members from two sources. From their recent trip overseas, C. B. Veal, S.A.E. Research Manager, and C. Herbert Baxley, S.A.E. Vice-President, have brought reports of visits to the Junkers Diesel aircraft engine plant in which they were shown all aspects of development and use of this spectacular German Diesel.

"There is a great deal to be said for the compression-ignition engine in sizes of not less than 1,000 hp. for long-range night bombers as well as civil aircraft," concludes A. H. R. Fedden, leading British aero engine authority, in his paper: "Trend of Air-Cooled Aero Engines – The Next Five Years," which is published as a feature of the October, 1937, Special Aviation issue of the *S.A.E. Journal*. Mr. Fedden reached this conclusion, among others, after a thorough engineering and cost analysis, comparing Diesel and gasoline types.

See Cuts and Data on Page 48

DIESEL PROGRESS

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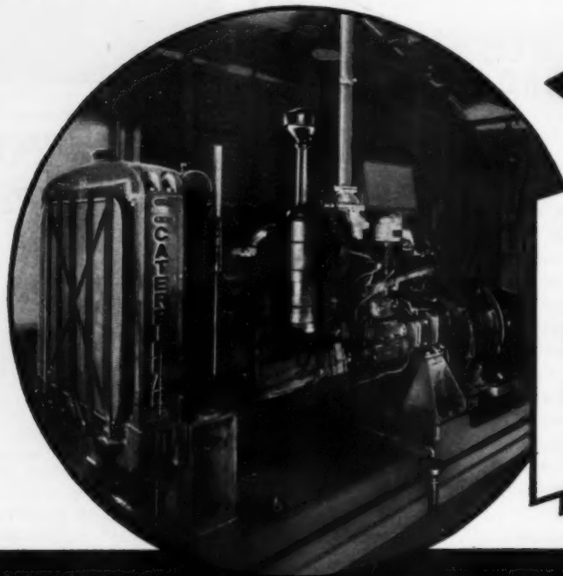

LOOK FOR THIS TRADE MARK

RPM

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DIESEL ENGINE LUBRICATING OIL

CAUTION: *There is only one Diesel engine lubricating oil identified by the "RPM" trade mark.*

Tested and PROVED LUBRICATION!

PATENTED DIESEL ENGINE LUBRICATING OIL SETS NEW RECORDS FOR PERFORMANCE

If it's a big-time job for your "Caterpillar" Diesel—you'll never miss a trick with this world-famous Diesel Engine lubricating oil!

"Caterpillar" Diesel operators throughout the world are talking about this sensational oil discovery—

"RPM" Diesel Engine Lubricating Oil—patented and identified by the trade mark "RPM."

Acclaimed in world-wide service—it's an oil that's been thoroughly tested and *proved*—

It's broken all records for Diesel engine top-performance—for "red-hot," full-load day-and-night operation. Grueling runs at full blast for thousands of hours proved that rings and pistons stay clean—proved that maintenance costs drop to lowest in history.

"Caterpillar" Diesel engine operators everywhere report amazing results—"the more punishment, the better it works!"

You'll be equally enthusiastic. Get the full benefit of your "Caterpillar" Diesel—insist on this famous, patented "RPM" Diesel Engine Lubricating Oil!

Recommended by
CATERPILLAR TRACTOR CO.

STANDARD OIL COMPANY OF CALIFORNIA

"RPM" DIESEL ENGINE LUBRICATING OIL IS DISTRIBUTED IN THE UNITED STATES BY:

The California Company (Montana only)
The Carter Oil Company, Tulsa, Okla. • Colonial Beacon Oil Company, Inc.
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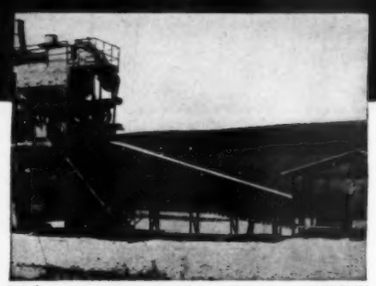
Standard Oil Company (Incorporated in Kentucky)
Standard Oil Company (Indiana) • Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania • Standard Oil Company of Texas
Standard Oil Company of California • Utah Oil Refining Company
Standard Oil Company (Nebraska) • The Standard Oil Company (Ohio)

—IN CANADA BY:

Imperial Oil Limited • Standard Oil Company of British Columbia Limited
—and by distributors in more than 100 other countries.



"After a year's operation using your 'RPM' Diesel Engine Lubricating Oil, the 'Caterpillar' Diesel engine is in perfect shape, and has given us continuous satisfactory performance. This record we credit a great deal to your oil."

"My eight 'Caterpillar' Diesel tractors have accumulated over 30,000 work hours in most grueling operations with 'RPM' Diesel Engine Lubricating Oil. We have had no ring-sticking trouble . . . engines run clean."

Changing Trails to Highways—

WITH LOW-COST GRAVEL

THE most progressive method of preparing road-materials cheaply is used on the great Pan-American Highway. Thoroughly modern is this rock-crushing and gravel-screening plant near Mexico City. Two 80-hp. "Caterpillar" Diesel Engines provide all the power needed for an output of 100 yards of 2-inch material per hour. And all they consume, jointly, is 27c worth of Diesel fuel per hour—making the fuel and lubrication cost *little more than one-third of a cent per cubic yard!*

There is scarcely an industry or power-application within their horsepower-range in which "Caterpillar" Diesel Engines cannot do the job better and more cheaply than any other type of power. Besides low operating-cost, "Caterpillar" Diesels create no problem of water-supply. No heavy maintenance or repair-expense. No half-way servicing facilities. Complete information always available—through any "Caterpillar" dealer or direct from us.

SEVEN ENGINE SIZES—44 TO 160 HP.

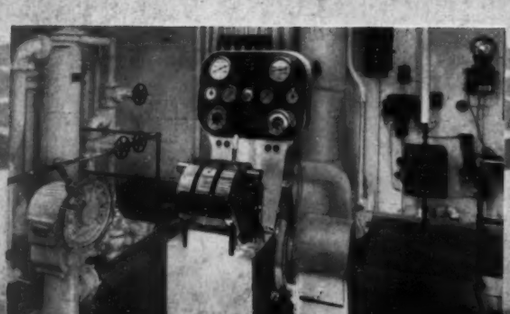
More than 80 leading machinery and equipment manufacturers power their products with "Caterpillar" Diesel Engines.

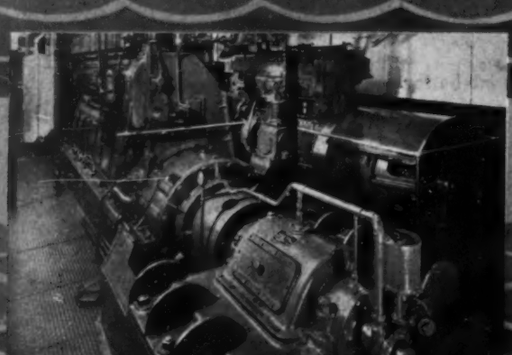
CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS . . . WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

THE NEWEST IN MOTORSHIPS
COOPER-BESSEMER POWERED! - - -





Designed for specific service in specific waters, Ford Motor Company's two new freighters "Green Island" and "Norfolk" embody many striking innovations. Through their all-welded construction and modern reduction gears . . . with compact Cooper-Bessemer Diesels for an unfailing source of power . . . they carry far more cargo, yet cost less to build.

Upper left—The Cooper-Bessemer centralized remote control stand, controls both main engines by means of single levers . . . simply and effectively.

Lower left—The "Green Island" engine room . . . Two 600 hp. Type GN-8 Diesels drive twin screws through Farrel-Birmingham reduction gears. Two 225 hp. Type EN-6 Diesel generator sets provide the auxiliary power.

THE COOPER-BESSEMER CORPORATION

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